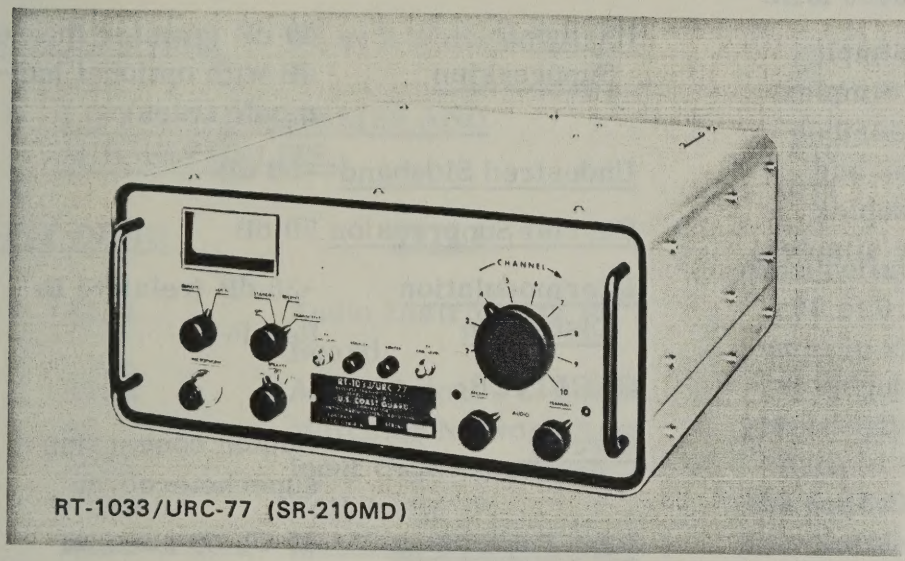
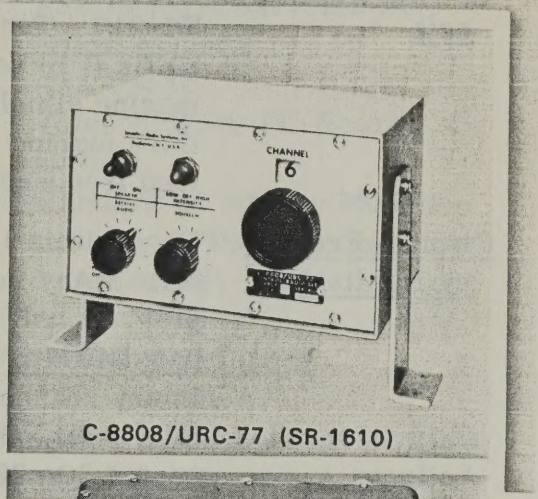
S-R-206,-210 (AN/URC-77)
(EXTRA PAGES)

SR SYSTEMS

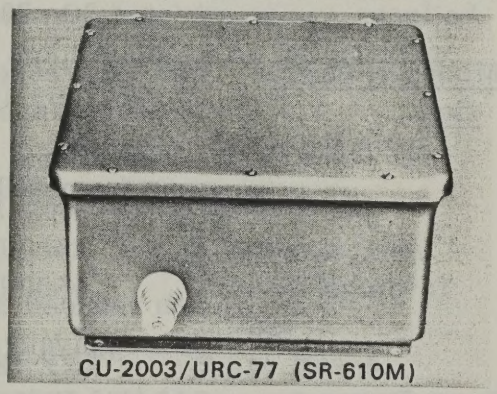
Scientific Radio Systems, Inc.



RT-1033/URC-77 (SR-210MD)



C-8808/URC-77 (SR-1610)



CU-2003/URC-77 (SR-610M)

HF SSB MARINE TRANSCEIVER

The SR-210M (AN/URC-77) HF SSB Transceiver is a rugged, reliable marine equipment with many interesting and unusual features. Modular plug-in printed wiring board construction is used throughout to permit easy maintenance or service—or to permit changes of a channel frequency in the field. It is possible to completely disassemble an SR-210M Transceiver in less than one-half hour using only a single tool—a Phillips screwdriver.

For maximum performance and protection against front-end burn out, a vacuum tube is used as the receiver first RF Amplifier. It is possible to apply 70 volts, on channel, into the receiver input circuit without damage. Also available is a plug-in FET Module which directly replaces the vacuum tube for those applications where a completely solid state receiver is required.

APC and PPC circuits are employed to prevent any damage to the Transmitter portion of the Transceiver under any VSWR conditions including short and open circuits.

Modes of operation are A3H (Compatible AM), A3J Single Sideband Suppressed Carrier (USB) and A3A (Single Sideband Reduced Carrier). The SR-210M (AN/URC-77) is available in either SR-210MS—simplex model or SR-210MD—two frequency simplex (half duplex). The simplex model can be changed to a duplex model by the addition of the AR-258 Switching Module and AR-257 Duplex Frequency Generator Board. Mode is programmed automatically.

Modular power supplies are available for 115 volt/230 VAC 47 to 63 Hz, for 115 VAC sine wave and 115V square wave, and 12 volt or 24 VDC or 32 VDC.

The standard SR-210M comes complete with microphone. Heavy mounting brackets and shock mounts are available as options.

FEATURES

- Up to Ten Channels—Simplex or Two Frequency Simplex (Half Duplex)
- 125 Watts PEP output 100 Watts Average (Keydown)
- Frequency Range 1.6 to 30 MHz (Type Accepted for 2.0 to 23 MHz)
- Modular Construction using plug-in Circuit Boards
- Drip-proof Case Per Mil-S-16
- Transmitter Protection Circuitry Against Open Circuit
- FCC Type Accepted (Part 83 and 87)

1.3 SPECIFICATIONS - SR-206/210 SSB TRANSCEIVER.

GENERAL:

Frequency Range	1.6000 to 30.0000 MHz
Number of Channels	SR-206 - Six Simplex SR-210 - Ten Simplex Suffix (MS) describes marine simplex and (MD) marine duplex (two frequency simplex)
Channel Frequency Limitations	None within 1.6 to 30 MHz. Any mix of simplex and half duplex is possible - any frequency in any channel is possible. (M) FCC Type Accepted 2 to 23 MHz.
Modes of Operation	usb suppressed carrier lsb suppressed carrier (optional) ame (compatible am) cw fsk usb reduced carrier voice privacy (option)
Input Power	115/230 Volt (switch selected) 47-63 Hz, 350 W max. -or- 12 or 24 Volt dc (with dc power supply) -or- 115V sine or square wave (switch selected)
Temperature Range	-30°C to +50°C

TRANSMITTER:

Power Output	ame - 37 Watt carrier (average) ssb - 150 Watts p.e.p. cw - 100 Watts (average) fsk - 100 Watts (average)
Output Impedance	50 Ohms nominal
Frequency Stability	±1 pp 10^6
Duty Cycle	Continuous operation (key down at 100 Watts average power output)
Harmonic Suppression	40 dB (greater than 62 dB with optional harmonic traps)
Undesired Sideband	-50 dB
Carrier Suppression	50 dB
Intermodulation Distortion	-30 dB (relative to p.e.p.)

RECEIVER:

Circuit	Double conversion superheterodyne
Input Impedance	50 Ohms nominal
Frequency Stability	±1 pp 10^6
Selectivity	
Wide Band ssb	3 kHz - 6 dB, shape factor 2.7:1
Narrow Band ssb	2.1 kHz - 3 dB, shape factor 2.5:1
am (std)	12 kHz - 3 dB
am (opt filter)	8 kHz - 6 dB, shape factor 2.5:1
Size	8H x 16-1/2W x 17-5/8D (inches) 20H x 42W x 45D (cm)
Weight	50 lbs (23 kg)
Sensitivity	
am	1.5 microvolts for 10 dB s + n/n at 30% modulation with optional am filter
ssb	0.5 microvolt for 10 dB s + n/n
AGC	Threshold 2.5 microvolts; fast attack, slow release; flat within 6 dB from 10 to 500,000 microvolts

Audio Response	300 to 3000 Hz ± 1 dB
Audio Output	4 Watts
Audio Distortion	5% at 2 Watts output

1.4 LIST OF ASSEMBLIES AND SUBASSEMBLIES.

REF DESIG	TITLE
A1A1	Audio Distribution PC Board
A1A2	Audio Output PC Board
A2	Matching Network Assy
A2A1	Input Capacitor Assy
A2A2	Coil Assy
A2A3-A2A12	Matching Network Modules
A3	RF Amplifier Module
A3A1	RF Amplifier & Mixer PC Board
A3A2	Power Control PC Board
A3A3 thru A3A12	Channel Tuning PC Boards
A3A13	Duplex Switching PC Boards (Marine Duplex only)
A4	IF/Audio PC Board
A5	Power Supply Module (ac or dc)
A5A1	Regulator PC Board
A5A2	Filter PC Board (ac) Starting Circuit PC Board (dc)
A6	Frequency Generator PC Board (2 types)
A6A1 thru A6A10	Channel Oscillator PC Boards
A6A11	Clarifier PC Board (option)
A7	Basic Option PC Motherboard
A7A1	CW PC Board (option)
A7A2	Vox PC Board (option)
A7A3	Special Option
A7A4	Squelch PC Board (option)
A8	Duplex Frequency Generator PC Board (Marine Duplex only)
A9	FSK Keyer/Converter PC Board (option)
A10	(Not Used)
A11	Voice Privacy PC Board (option)
(No Prefix)	Standard or Marine Motherboard (p/o Main Frame Assembly)

1.5 EQUIPMENT SUPPLIED.

The following items are supplied with each Transceiver. Optional items are supplied as ordered and are listed on the packing list for each shipment.

QTY	PART NO.	DESCRIPTION
1	SR-206/210(M)	Transceiver
1	MP0502	Alignment Tool
1	MP0504	Contact Removal Tool
1 set	FXXXXX	Spare Fuses
1	DS1001	Spare Lamp
1	TM-0210( )	Technical Manual

Also furnished are all mating plugs and/or options as required, including a standard microphone or optional handset or deskset.

1.6 EQUIPMENT REQUIRED BUT NOT SUPPLIED.

1.6.1 Antenna Coupler. - Unless the Transceiver is used with a broadband antenna or with a fan doublet, if multi-channel operation is required, an antenna coupler is required. The SR-610M Antenna Coupler is recommended.

1.6.2 Cable. - When the Transceiver is used with an antenna coupler, two cables are required for interconnection with that unit. One will be the coaxial cable (either RG-8A/U or RG-58/U) for the rf connection, and the other is the multiconductor control cable. Terminals and plugs for the cable are supplied with the Transceiver and the Antenna Coupler.

1.6.3 Antenna. - An antenna is required for use with this Transceiver. Any broadband antenna with a vswr (voltage standing wave ratio) of 2:1 or better, with a nominal impedance of 50 Ohms, is suitable. If only a single frequency is used, a doublet antenna can be used if it is adjusted to the proper length for your channel frequency. For multi-channel use with an antenna coupler, any of the following antennas may be used. The longwire antennas are furnished with halyards and insulators. The whip antennas are furnished with mounting bases and mounting hardware:

AR-248 - 75 foot long wire
AR-249 - 150 foot long wire
AR-267 - 9 foot stainless steel whip
AR-268 - 16 foot fiberglass whip
AR-269 - 35 foot fiberglass whip

OPERATOR - MAINTENANCE
INSTRUCTION MANUAL/TM-0210-9

FOR ALL UNITS WITH SERIAL NO. PREFIX "E"

SR-206, SR-210
HF SSB TRANSCEIVER

MAY 1975

SR SYSTEMS

SCIENTIFIC RADIO SYSTEMS INC.
367 ORCHARD STREET
ROCHESTER, NEW YORK U.S.A.

SR-206, SR-210

HF SSB TRANSCEIVER

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Number of Channels	SR-206 - Six Simplex SR-210 - Ten Simplex Suffix (MS) describes marine simplex and (MD) marine duplex (two frequency simplex)
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Modes of Operation	usb suppressed carrier lsb suppressed carrier (optional) ame (compatible am) cw fsk usb reduced carrier voice privacy (option)
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Power Output	ame - 37 Watt carrier (average) ssb - 150 Watts p.e.p. cw - 100 Watts (average) fsk - 100 Watts (average)
Output Impedance	50 Ohms nominal
Frequency Stability	±1 pp 10^6
Duty Cycle	Continuous operation (key down at 100 Watts average power output)
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RECEIVER:

Circuit	Double conversion superheterodyne
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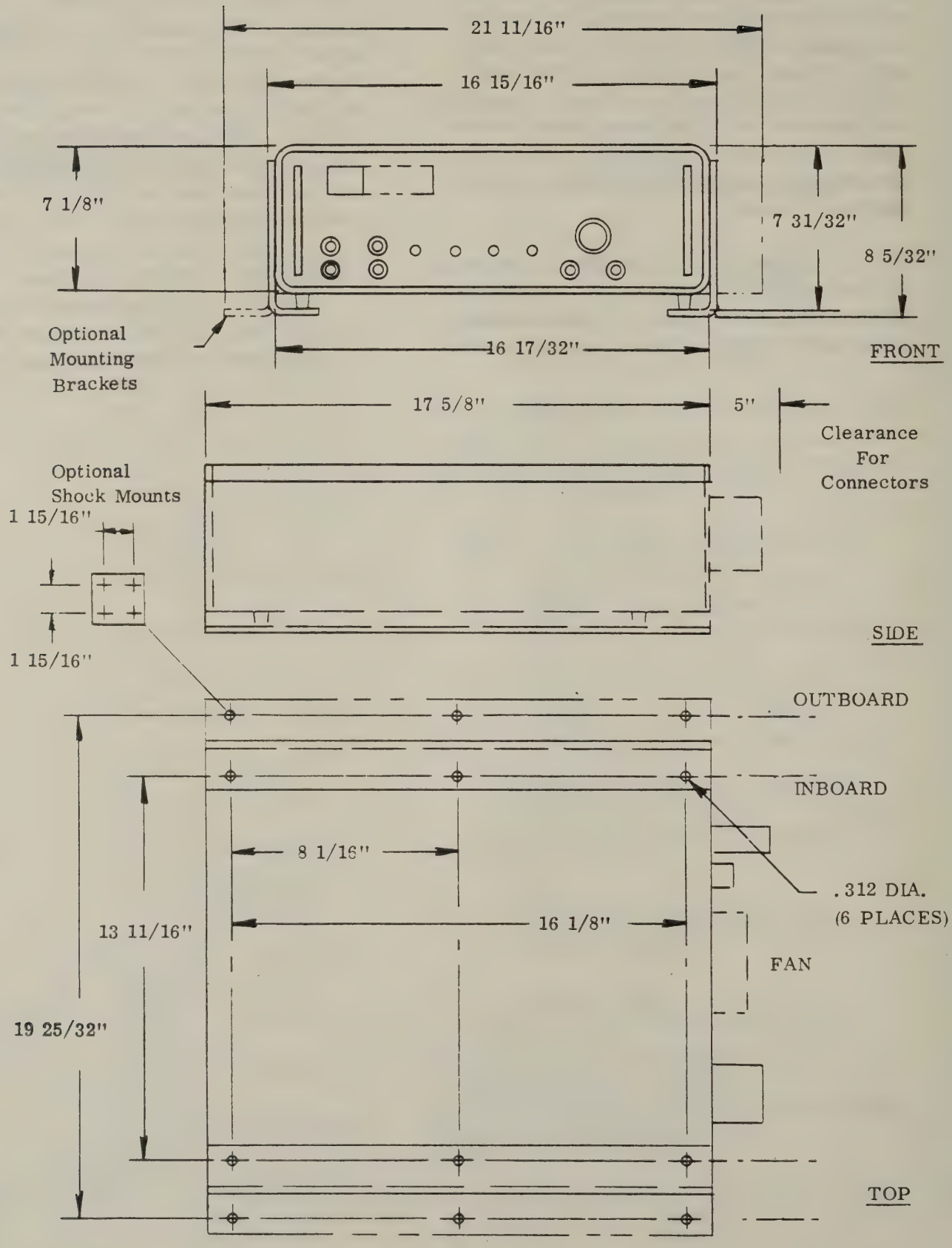

Figure 2-1. Mounting Dimensions

OPERATOR - MAINTENANCE
INSTRUCTION MANUAL/TM-0210-9

S4035-0081

FOR ALL UNITS WITH SERIAL NO. PREFIX "E"

SR-206, SR-210
HF SSB TRANSCEIVER

MAY 1975

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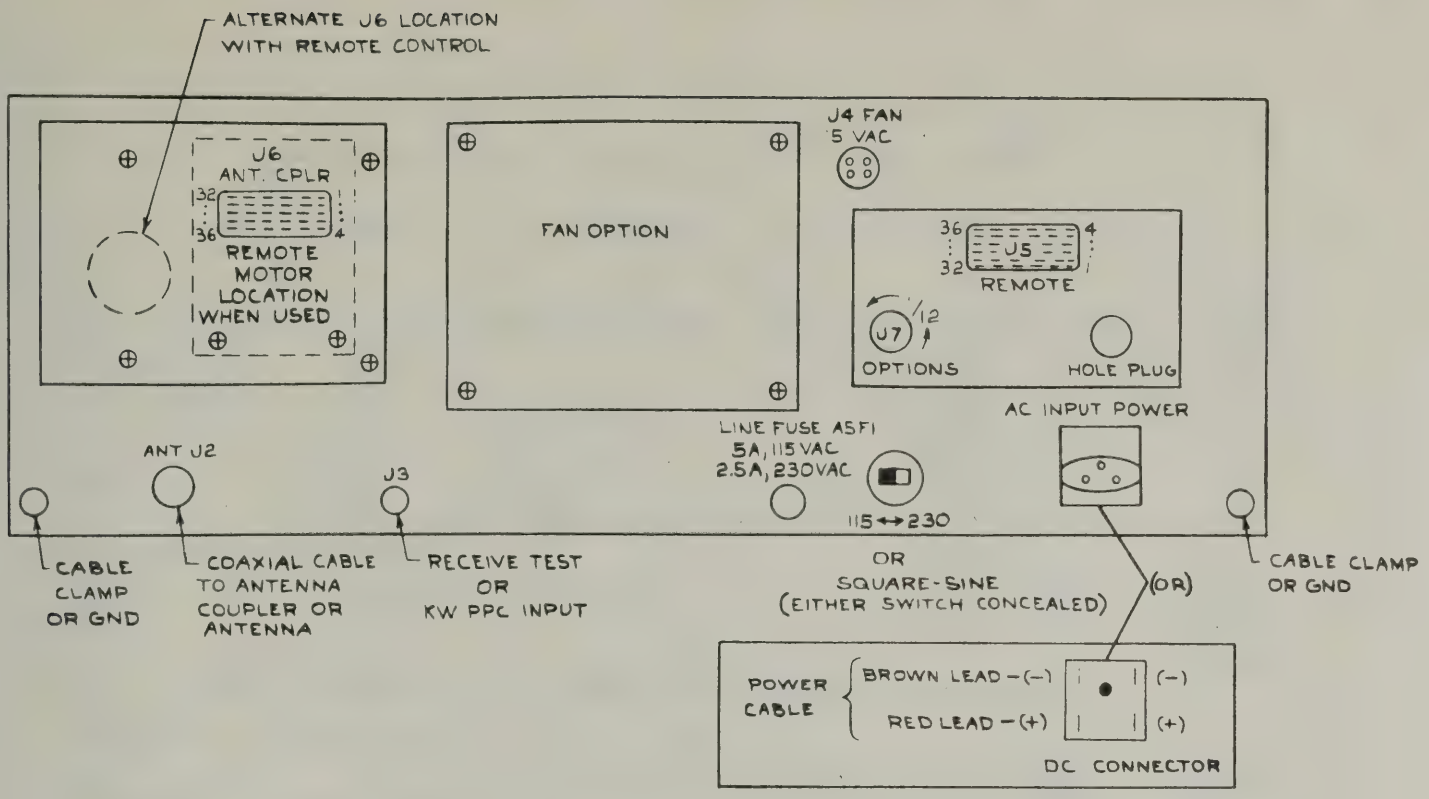


Figure 2-2. Rear Panel Connectors

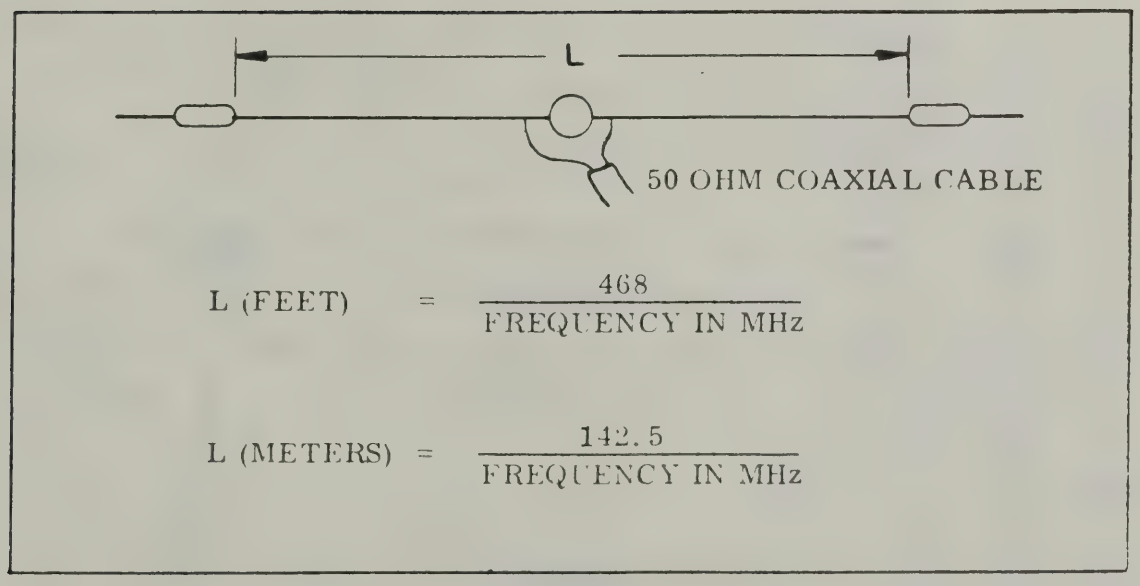


Figure 2-3. Design of Horizontal Doublet Antenna

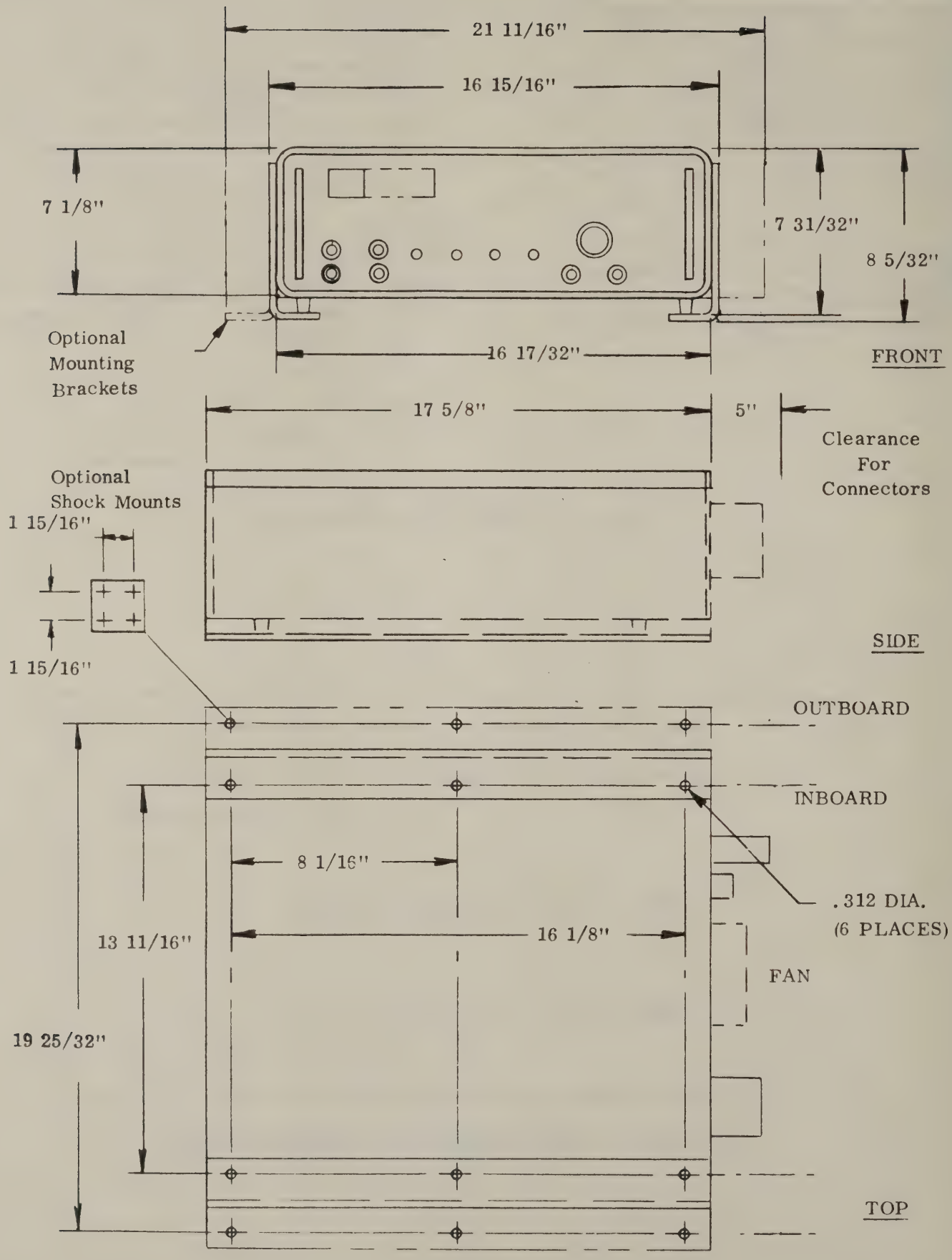


Figure 2-1. Mounting Dimensions

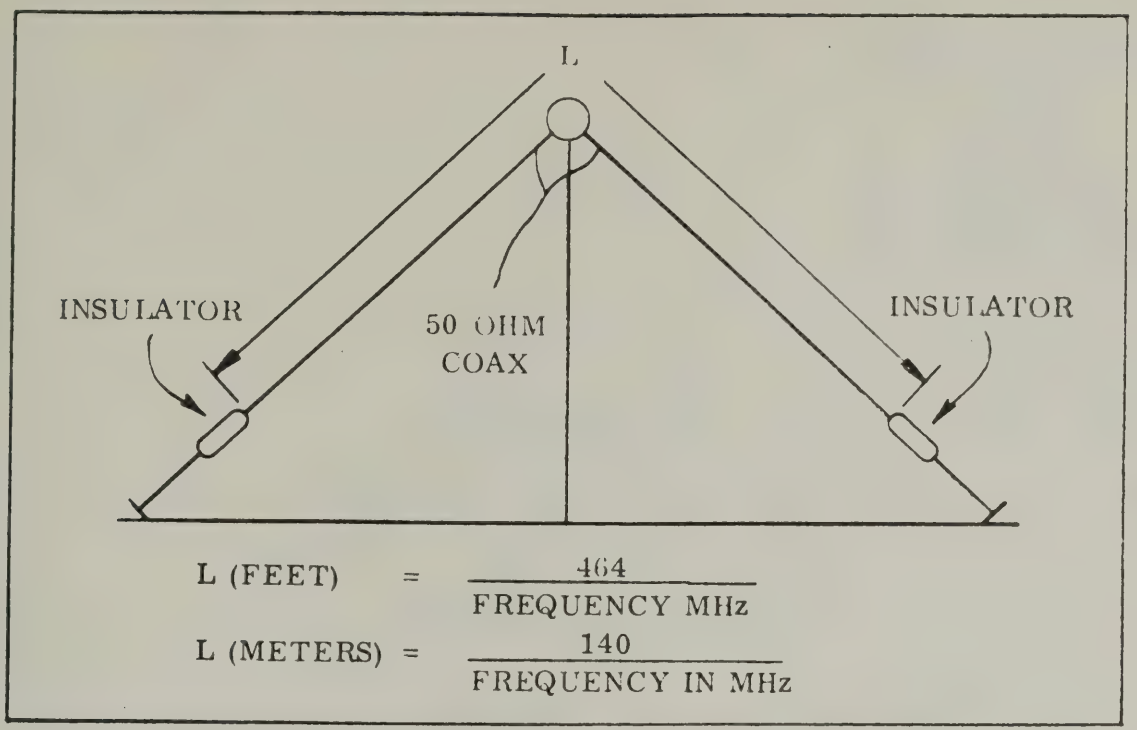


Figure 2-4. Design of Inverted "V" Antenna

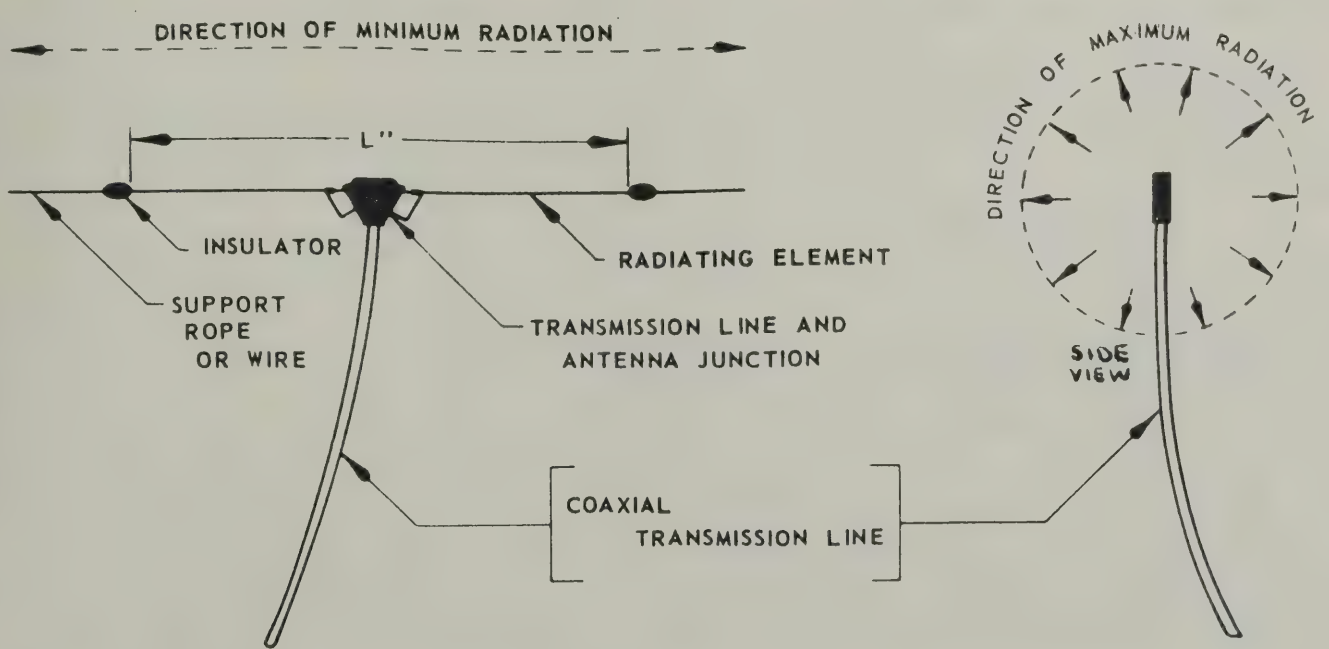
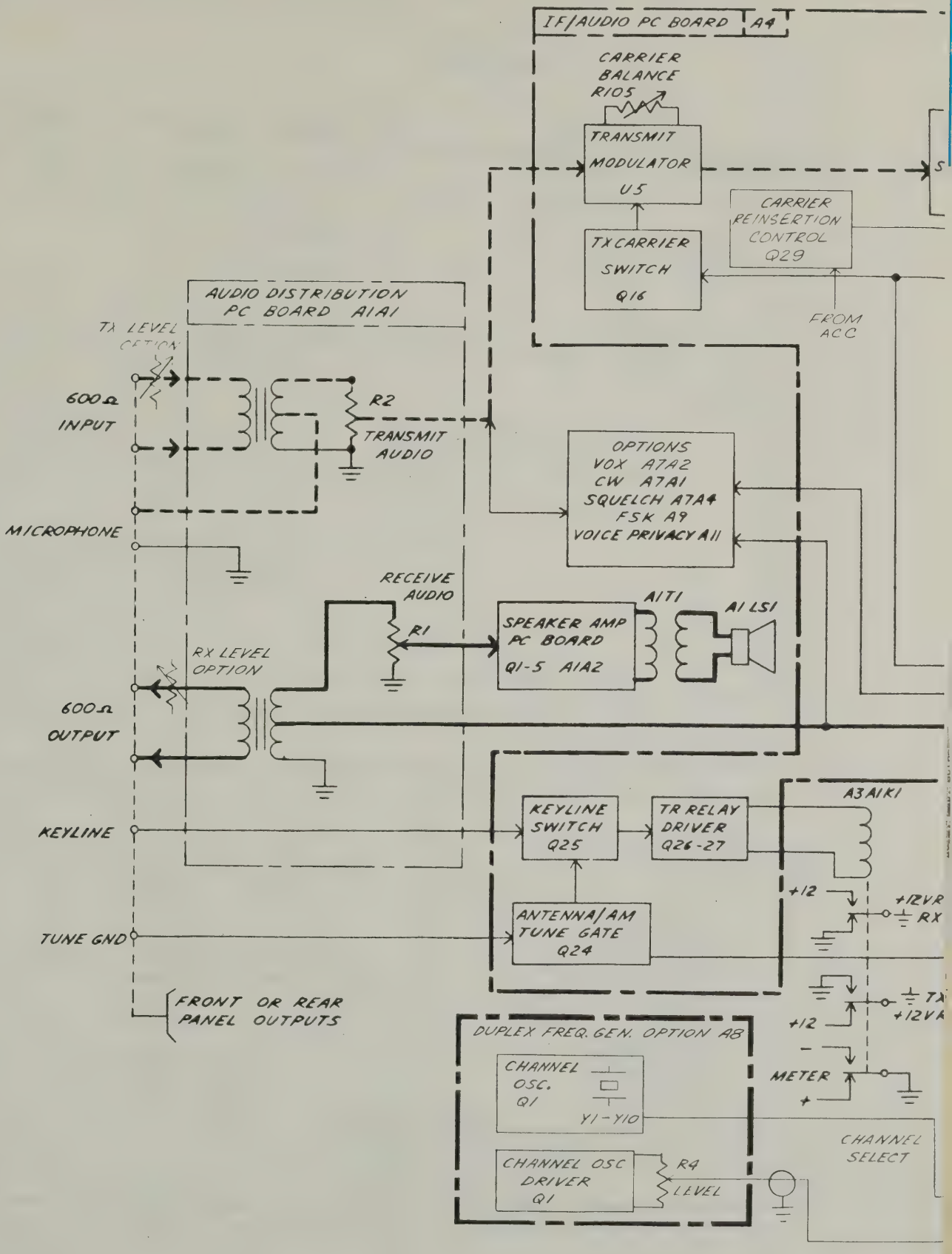


Figure 2-5. Construction Details and Direction of Radiation of Doublet Antennas


IF/AUDIO PC BOARD A4
CARRIER BALANCE R105
TRANSMIT MODULATOR U5
CARRIER REINSERTION CONTROL Q29
TX CARRIER SWITCH Q16
FROM ACC
AUDIO DISTRIBUTION PC BOARD A1A1
TX LEVEL OPTION
600Ω INPUT
R2
TRANSMIT AUDIO
MICROPHONE
OPTIONS
VOX A7A2
CW A7A1
SQUELCH A7A4
FSK A9
VOICE PRIVACY A11
RECEIVE AUDIO
R1
SPEAKER AMP PC BOARD Q1-5 A1A2
A1T1
A1LS1
RX LEVEL OPTION
600Ω OUTPUT
KEYLINE
KEYLINE SWITCH Q25
TR RELAY DRIVER Q26-27
A3A1K1
+12
+12VR RX
TUNE GND
ANTENNA/AM TUNE GATE Q24
FRONT OR REAR PANEL OUTPUTS
DUPLEX FREQ. GEN. OPTION A8
CHANNEL OSC. Q1
Y1-Y10
CHANNEL OSC DRIVER Q1
R4
LEVEL
METER
CHANNEL SELECT

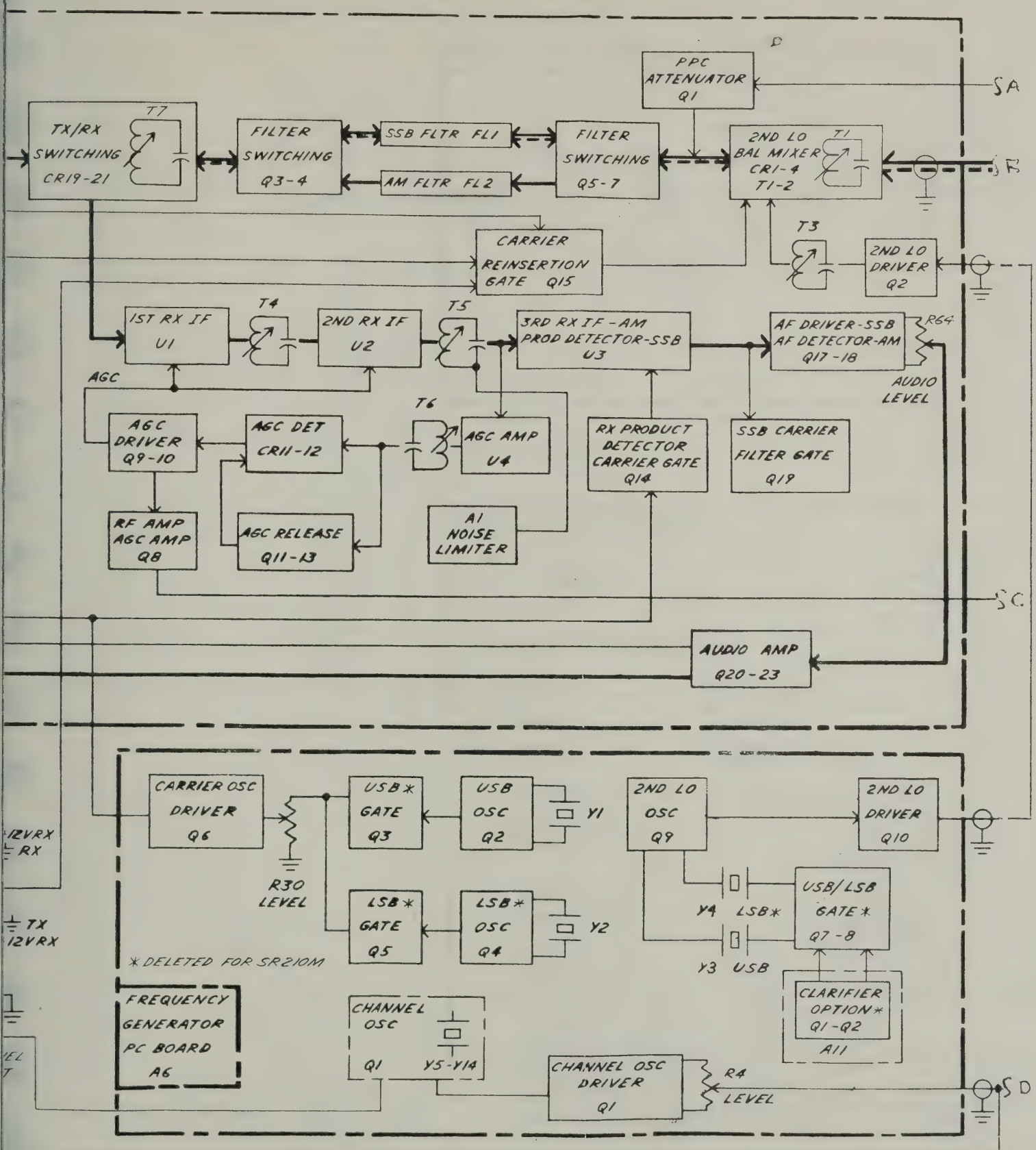
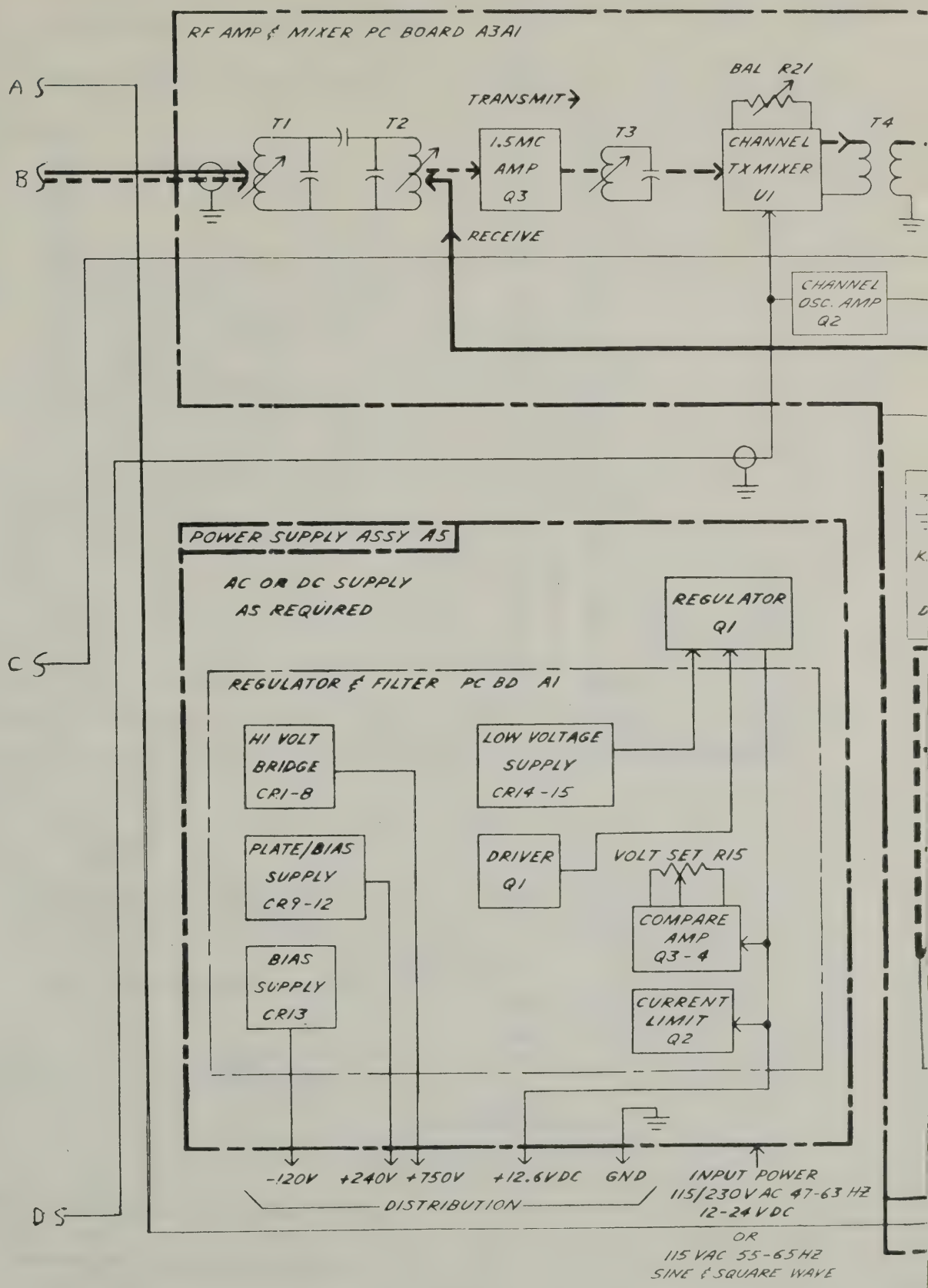


Figure 6-1. Transceiver Block Diagram (Sheet 1 of 2)


RF AMP & MIXER PC BOARD A3A1
A
B
C
D
BAL R21
TRANSMIT
T1
T2
1.5MC AMP Q3
T3
CHANNEL TX MIXER U1
T4
RECEIVE
CHANNEL OSC. AMP Q2
POWER SUPPLY ASSY A5
AC OR DC SUPPLY AS REQUIRED
REGULATOR Q1
REGULATOR & FILTER PC BD A1
HI VOLT BRIDGE CR1-8
LOW VOLTAGE SUPPLY CR14-15
PLATE/BIAS SUPPLY CR9-12
DRIVER Q1
VOLT SET R15
COMPARE AMP Q3-4
BIAS SUPPLY CR13
CURRENT LIMIT Q2
-120V
+240V
+750V
+12.6VDC
GND
DISTRIBUTION
INPUT POWER
115/230V AC 47-63 HZ
12-24 V DC
OR
115 VAC 55-65 HZ
SINE & SQUARE WAVE

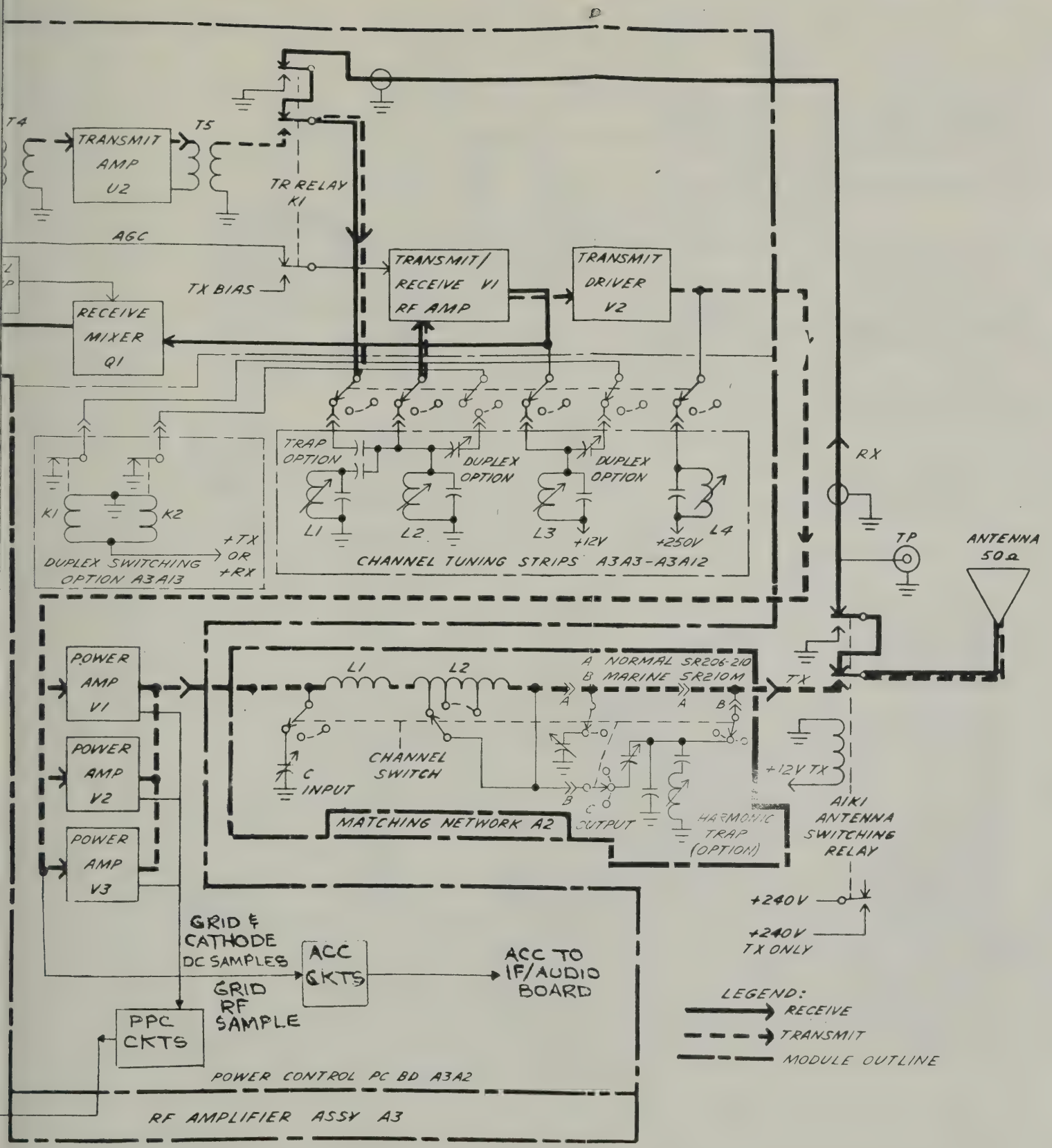
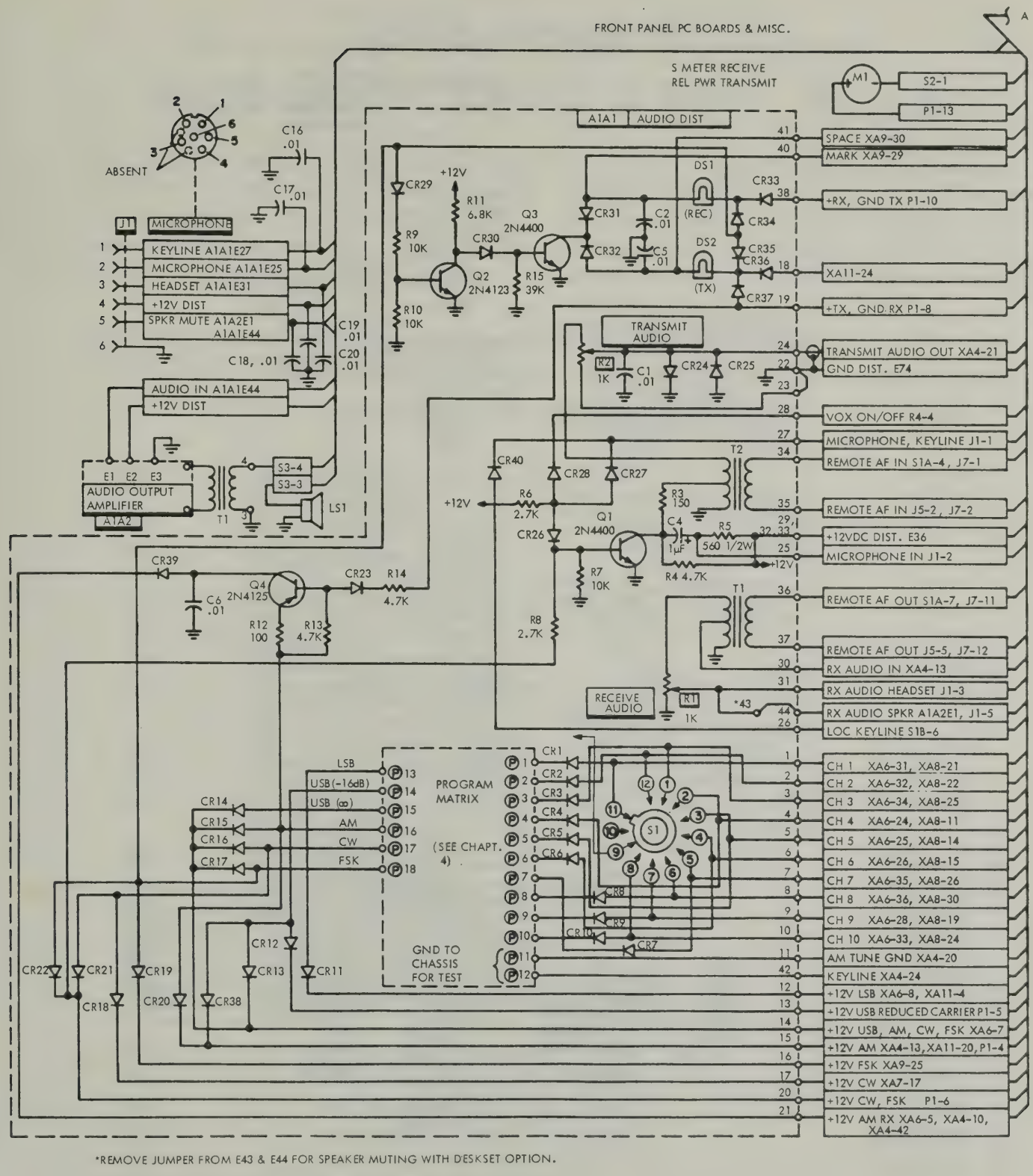


Figure 6-1. Transceiver Block Diagram (Sheet 2 of 2)



*REMOVE JUMPER FROM E43 & E44 FOR SPEAKER MUTING WITH DESKSET OPTION.

Figure 6-5A. Main Frame Interconnection Diagram, SR-206/210, Type II FOR REMOTE - CONTROLLED TRANSCEIVERS

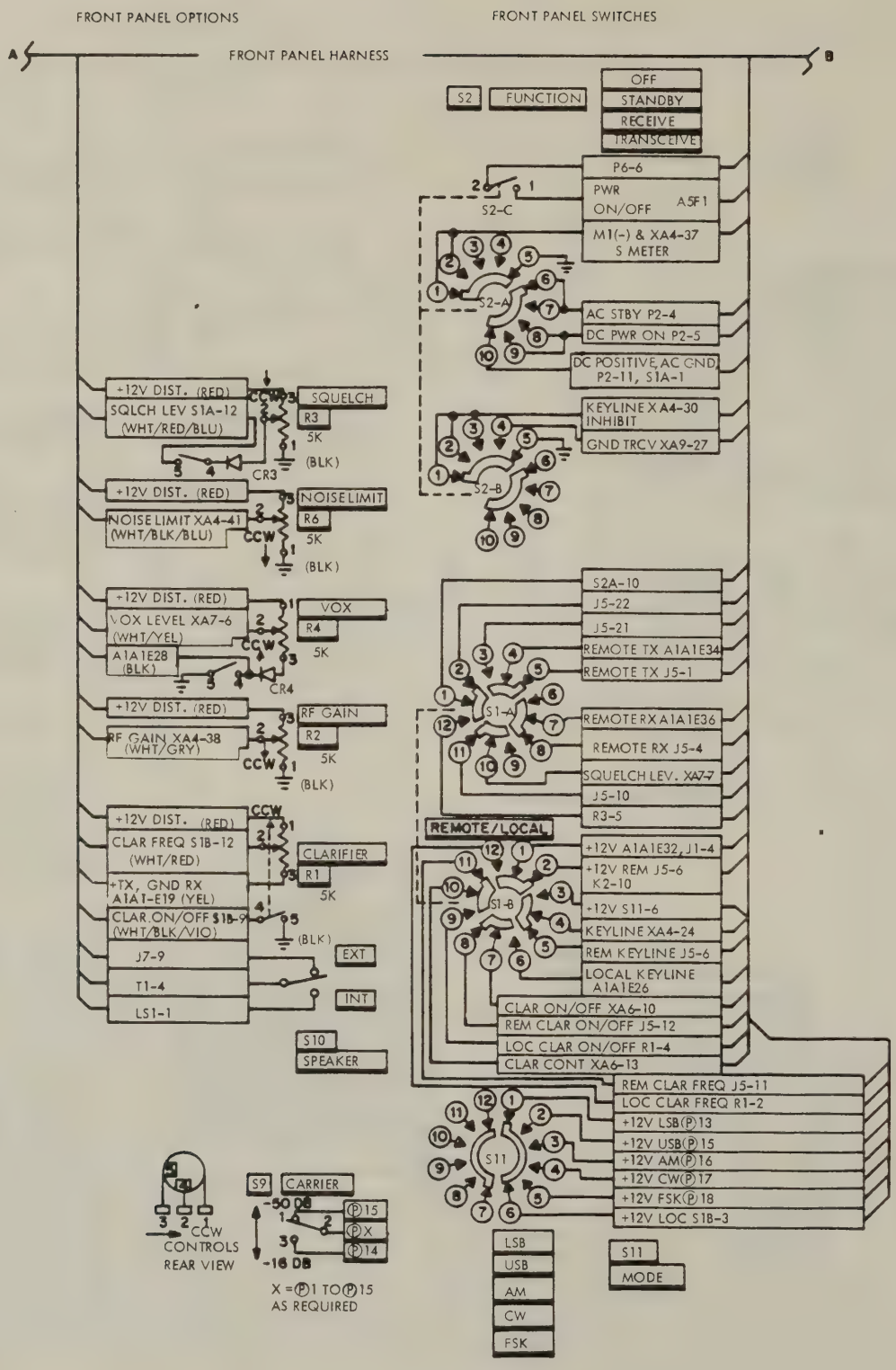


Figure 6-5A. Main Frame Interconnection Diagram, SR-206/210, Type II
FOR REMOTE - CONTROLLED TRANSCEIVERS

CHAPTER 7
AUDIO OUTPUT ASSY A1A2

The Audio Output Board, located on the front panel, provides the gain necessary to deliver 4 Watts to the speaker. The speaker (and transformer on the main frame) are driven by Q4 and Q5, push-pull amplifiers, which in turn are driven by emitter followers Q2 and Q3. Q1 provides the phase splitting necessary without a transformer input. Q6 is a preamplifier. CR2 and CR3 provide temperature compensation for output quiescent current control.

REF DESIG	DESCRIPTION	P/N
---	AUDIO OUTPUT PC BOARD ASSEMBLY	200090
C1	Cap, tant, 1 μF, 10%, 35 Vdcw	C41056
C2	Cap, tant, 22 μF, 10%, 15 Vdcw	C42263
C3	Cap, tant, 22 μF, 10%, 15 Vdcw	C42263
C4	Not used	---
C5	Cap, cer, 0.1 μF, +80-20%, 25 Vdcw	C11000
C6	Cap, cer, .01 μF, 10%, 500 Vdcw	C10100
C7	Cap, cer, 0.1 μF, +80-20%, 25 Vdcw	C11000
C8	Cap, tant, 1 μF, 10%, 35 Vdcw	C41056
C9	Cap, tant, 10 μF, 10%, 20 Vdcw	C41064
CR1	Diode, si, signal, 1N4148	CR4148
CR2	Diode, si, signal, 1N4148	CR4148
CR3	Diode, si, signal, 1N4148	CR4148
Q1	Transistor, npn, 2N4123	Q41230
Q2	Transistor, npn, 2N4123	Q41230
Q3	Transistor, npn, 2N4123	Q41230
Q4	Transistor, npn, power, 2N5296	Q52960
Q5	Transistor, npn, power, 2N5296	Q52960
Q6	Transistor, npn, 2N4123	Q41230
R1	Res, comp, 4.7K, 5%, 1/4W	R20472
R2	Res, comp, 2.2K, 5%, 1/4W	R20222
R3	Res, comp, 180Ω, 5%, 1/4W	R20181
R4	Res, comp, 220Ω, 5%, 1/4W	R20221
R5	Res, comp, 1K, 5%, 1/4W	R20102
R6	Res, comp, 1K, 5%, 1/4W	R20102
R7	Res, comp, 3.3K, 5%, 1/4W	R20332
R8	Res, comp, 220Ω, 5%, 1/4W	R20221
R9	Res, comp, 220Ω, 5%, 1/4W	R20221
R10	Res, comp, 1.5Ω, 5%, 1/2W	R301R5

AUDIO OUTPUT PC BD ASSY (CONT.)

REF DESIG	DESCRIPTION	P/N
R11	Res, comp, 1.5Ω, 5%, 1/2W	R301R5
R12	Not used	---
R13	Res, comp, 100Ω, 5%, 1/4W	R20101
R14	Res, comp, 27K, 5%, 1/4W	R20273
R15	Res, comp, 2.2K, 5%, 1/4W	R20222
R16	Res, comp, 4.7K, 5%, 1/4W	R20472
R17	Res, comp, 270Ω, 5%, 1/4W	R20271

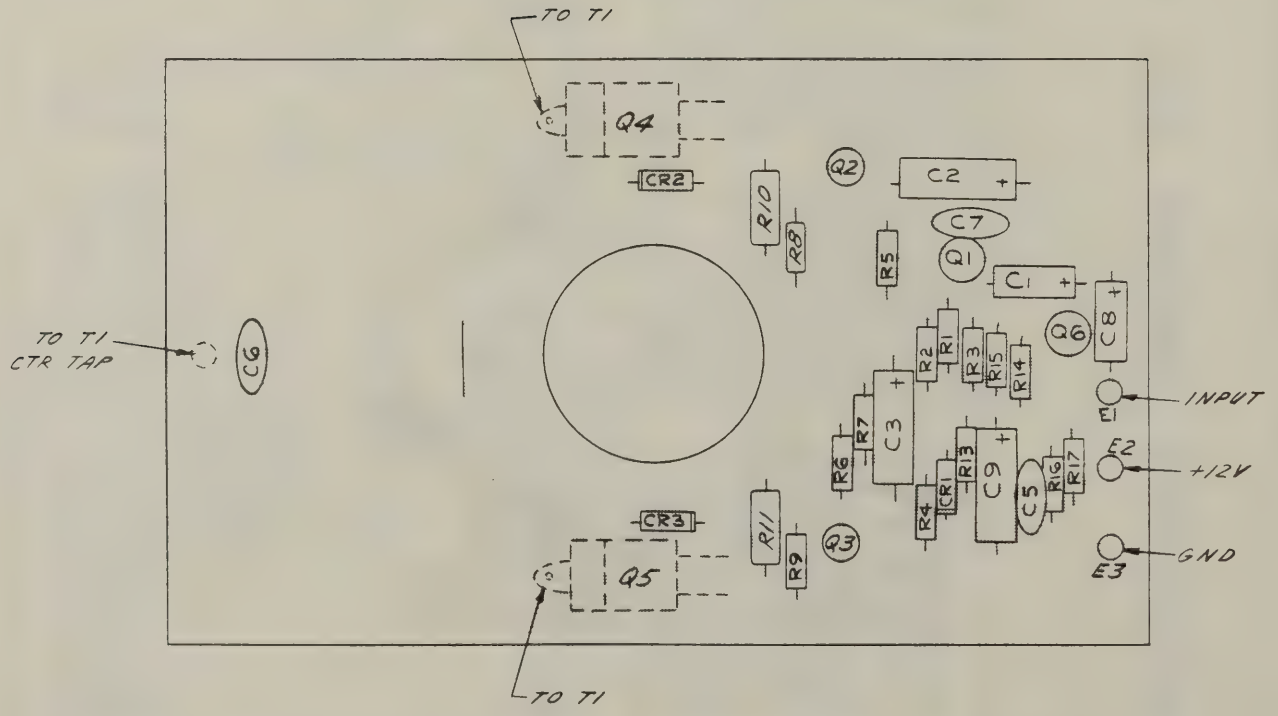
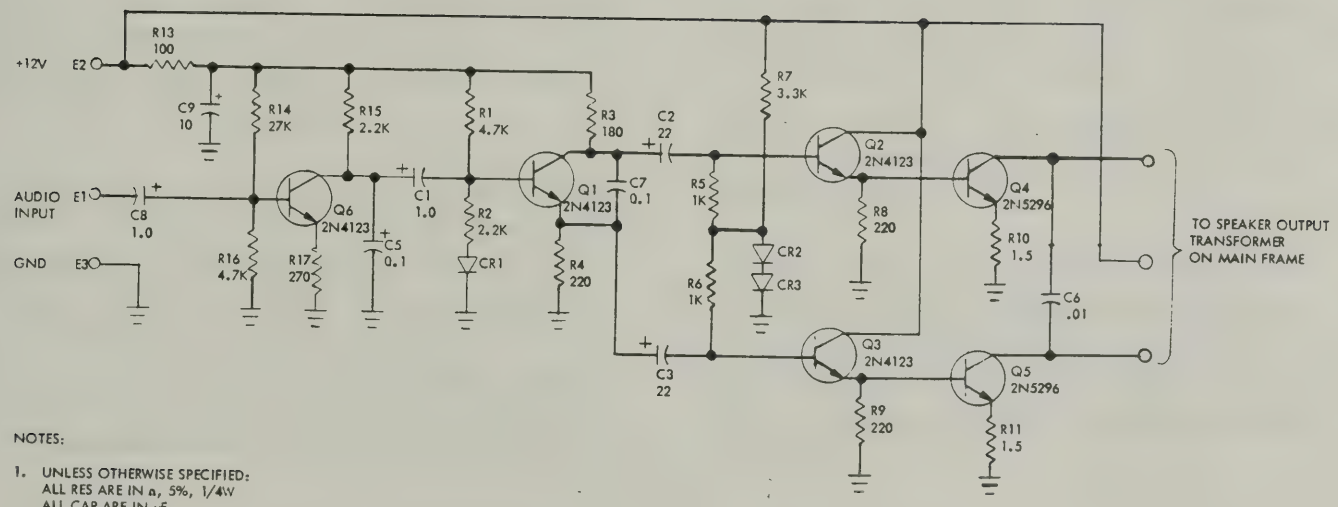


Figure 7-1. Audio Output Assembly



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   ALL RES ARE IN Ω, 5%, 1/4W
   ALL CAP ARE IN μF

2. REPLACEMENT SEMICONDUCTOR TYPES ARE SPECIFIED. OTHER TYPES MAY BE USED BY THE FACTORY.

Figure 7-2. Audio Output Assy A1A2, Schematic Diagram

CHAPTER 8
PA MATCHING NETWORK ASSY A2

TABLE OF CONTENTS

----------	General Description
----------	Parts List
Figures 8-1 & 8-2	Front and Bottom Views
Figure 8-3	Input Capacitor Assy A2A1
Figure 8-4	Schematic Diagram

The plate supply and loading for the power amplifier tubes is provided by the A2 Matching Network Assembly. Plate parasitic suppressor chokes L1, L2, and L3 are connected to plate supply choke L4 which is connected to the +750 supply.

Matching the plate impedance of the transceiver is accomplished by the Pi Network consisting of input capacitors C6 and C7, Series Coils L5 and L6, series capacitors C12 and C13, and output capacitors C8 and C9. (A second harmonic trap consisting of L7 and C14 provides additional second harmonic attenuation for marine-type sets only.)

The input capacitor is selected by S1-A, and the output module assembly by S1-C and S1-D. The output module assembly consists of C8 and C9, C12 and C13, (and C14 and L7). (S1-E, an open-seeking wafer, connects a damping resistor across each of the second harmonic traps except the one in use.)

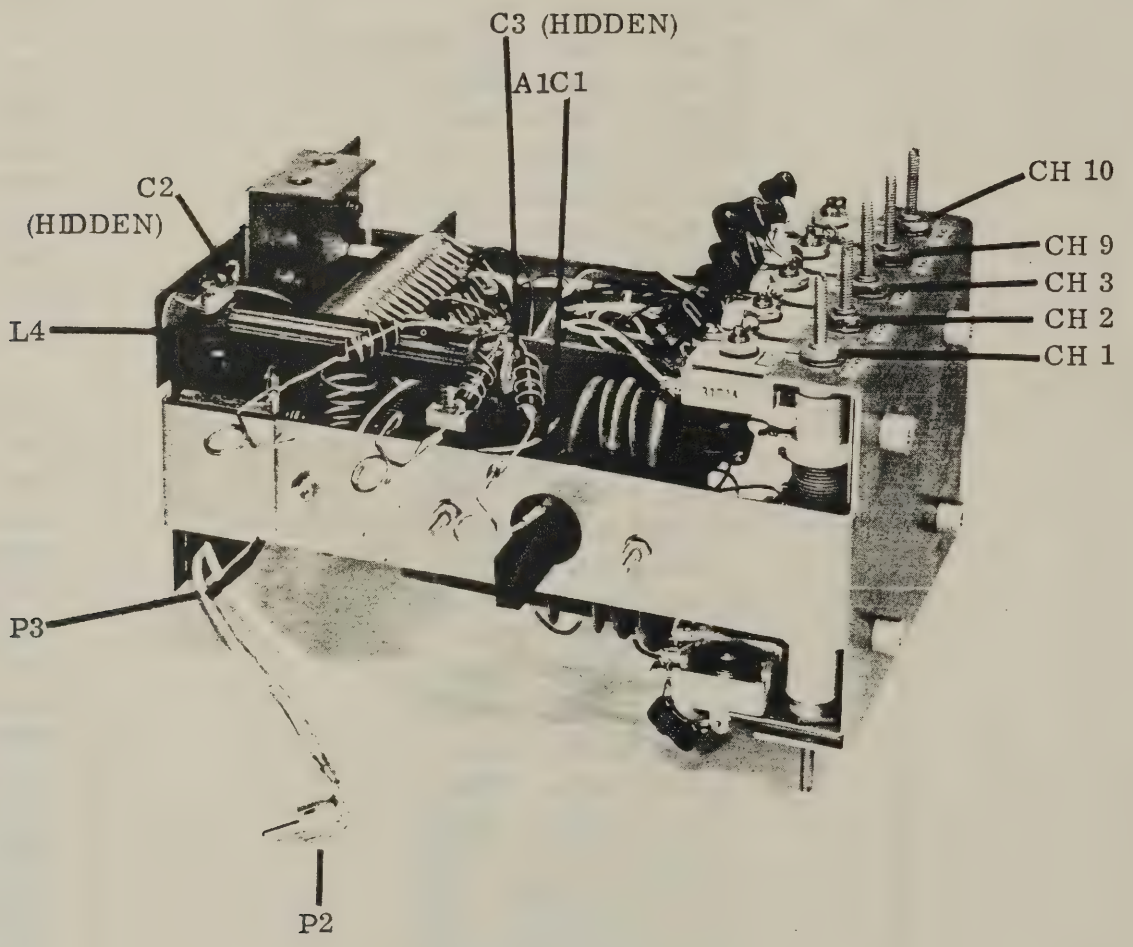
Neutralization of the power amplifier is accomplished by feedback from the plate circuit through neutralizing capacitor C10, blocking capacitor C1, to the plate circuit of 1A3A1V2 on the RF Amplifier and Mixer Board.

REF DESIG	DESCRIPTION	P/N
---	PA MATCHING NETWORK	210200
A2A1	Input Capacitor PC Board Assembly	210203
A2A2	Coil Assembly	200205
A2A3 thru A12	Output Module Assembly, as listed below:	210206-
	2.0-2.25 MHz	001
	2.25-2.5 MHz	002
	2.5-3.0 MHz	003
	3.0-3.5 MHz	004
	3.5-4.0 MHz	005
	4.0-4.5 MHz	061
	4.5-5.0 MHz	062
	5.0-5.5 MHz	071
	5.5-6.0 MHz	072
	6.0-7.0 MHz	008
	7.0-8.0 MHz	009
	8.0-9.0 MHz	101
	9.0-10.0 MHz	102
	10.0-11.0 MHz	111
	11.0-12.0 MHz	112
	12.0-13.0 MHz	121
	13.0-14.0 MHz	122
	14.0-15.0 MHz	131
	15.0-16.0 MHz	132
	16.0-17.0 MHz	141
	17.0-18.0 MHz	142
	18.0-19.0 MHz	151
	19.0-20.0 MHz	152
	20.0-21.0 MHz	161
	21.0-22.0 MHz	162
C1	Not used	---
C2	Cap, cer, .01μF, 1.6 kVdcw	C00001
J1	Lug, quick-disconnect, single 45°	J00155
J2	Lug, quick-disconnect, single 45°	J00155
L1	Choke, parasitic, 4t no. 22 on R40470	L20002
L2	Choke, parasitic, 4t no. 22 on R40470	L20002
L3	Choke, parasitic, 4t no. 22 on R40470	L20002
L4	Choke, plate	L20001
P1	Plug, phono	P00101
P2	Plug, phono	P00101
P3	Socket, quick-disconnect, 0.030	J00151

REF DESIG	DESCRIPTION	P/N
R1-R2	Not used	---
R3-R12	Res, comp, 330Ω, 5%, 1/2W	R30331
S1-A	Switch wafer, 1 pole, 10 pos	S10200
S1-B	Switch wafer, 1 pole, 10 pos	S10200
S1-C	Switch wafer, 1 pole, 10 pos	S10200
S1-D	Switch wafer, 1 pole, 10 pos	S10200
S1-E	Switch wafer, 10 pos, open-seeking	S10205
A1	INPUT CAPACITOR PCB ASSY	210203
A1C1	Cap, cer, .01μF, 1.6 kVdcw	C00001
A1C2-C5	Not used	---
A1C6	Cap, cer, 5%, 1KV as listed below:	
	2.0-2.5 MHz, 560pF	C00014
	2.5-3.0 MHz, 470pF	C00013
	3.0-3.5 MHz, 390pF	C00012
	3.5-4.0 MHz, 330pF	C00011
	4.0-5.0 MHz, 220pF	C00016
	5.0-6.0 MHz, 180pF	C00009
	6.0-7.0 MHz, 150pF	C00008
	7.0-8.0 MHz, 120pF	C00017
	8.0-10.0 MHz, 100pF	C00007
	10.0-12.0 MHz, 68pF	C00006
	12.0-14.0 MHz, 56pF	C00018
	14.0-16.0 MHz, 39pF	C00005
	16.0-18.0 MHz, 33pF	C00019
	18.0-20.0 MHz, 27pF	C00020
	20.0-22.0 MHz, 22pF	C00004
A1C7	Cap, cer, 5%, 1KV, as listed below:	
	2.0-2.5 MHz, 180pF	C00009
	2.5-30.0 MHz, None Required	---
A1C8-C9	Not used	---
A1C10	Cap, cer, 3.3pF, 5%, np0	C00015
A1R1	Res, comp, 2.2 meg, 5%, 1/2W	R30225
A1R2	Res, comp, 2.2 meg, 5%, 1/2W	R30225
A2	COIL ASSY	200205
A2C1-C10	Not used	---
A2C11	Cap, mica, 15pF, 5%, 500 Vdcw	C05150
A2L1-L4	Not used	---
A2L5	Coil, rf, 6t no. 14 on 1/2 in dia	L20005
A2L6	Coil, rf, Air-dux	L20004

REF DESIG	DESCRIPTION	P/N
A( )C10-C11	Not used	---
A( )C12	Cap, mica, var, 500V, as listed below:	
	2.0-3.0 MHz, 1200-2525pF	C63007
	3.0-3.5 MHz, 800-1970pF	C63008
	3.5-5.0 MHz, 615-1600pF	C63001
	5.0-8.0 MHz, 425-1260pF	C63006
	8.0-14.0 MHz, 180-690pF	C63002
	14.0-22.0 MHz, 100-500pF	C63003
A( )C13	Cap, mica, 5%, 500V, as listed below:	
	2.0-3.0 MHz, 390pF	C05391
	3.0-3.5 MHz, 150pF	C05151
	3.5-5.0 MHz, None Required	---
	5.0-6.0 MHz, 68pF	C05680
	6.0-8.0 MHz, None Required	---
	8.0-10.0 MHz, 120pF	C05121
	10.0-12.0 MHz, 68pF	C05680
	12.0-14.0 MHz, 47pF	C05470
	14.0-16.0 MHz, 68pF	C05680
	16.0-18.0 MHz, 47pF	C05470
	18.0-20.0 MHz, 33pF	C05330
	20.0-21.0 MHz, 22pF	C05220
	21.0-22.0 MHz, 10pF	C05100
A( )C14	Cap, mica, 5%, 500V, as listed below:	
	2.0-2.25 MHz, 510pF	C06511
	2.25-2.5 MHz, 750pF	C06751
	2.5-3.5 MHz, 470pF	C06471
	3.5-4.0 MHz, 360pF	C05361
	4.0-4.5 MHz, 270pF	C05271
	4.5-5.0 MHz, 220pF	C05221
	5.0-5.5 MHz, 180pF	C05181
	5.5-6.0 MHz, 150pF	C05151
	6.0-7.0 MHz, 160pF	C05161
	7.0-8.0 MHz, 120pF	C05121
	8.0-9.0 MHz, 180pF	C05181
	9.0-10.0 MHz, 150pF	C05151
	10.0-11.0 MHz, 120pF	C05121
	11.0-12.0 MHz, 91pF	C05910
	12.0-13.0 MHz, 82pF	C05820
	13.0-14.0 MHz, 75pF	C05750
	14.0-15.0 MHz, 120pF	C05121
	15.0-16.0 MHz, 100pF	C05101
	16.0-17.0 MHz, 91pF	C05910
	17.0-18.0 MHz, 75pF	C05750
	18.0-19.0 MHz, 68pF	C05680
	19.0-20.0 MHz, 62pF	C05620
	20.0-21.0 MHz, 56pF	C05560
	21.0-22.0 MHz, 51pF	C05510

REF DESIG	DESCRIPTION	P/N
A( )L7	Coil, rf, var, as listed below:	
	2.0-2.25 MHz, 2.3-4.4μH	L32008
	2.25-3.0 MHz, 1.4-2.3μH	L32007
	3.0-6.0 MHz, .95-1.7μH	L32006
	6.0-8.0 MHz, .65-1.1μH	L32005
	8.0-14.0 MHz, .4-.7μH	L32004
	14.0-22.0 MHz, .24-.38μH	L32003



P2 - Relative Power (To A3A2J2)
P3 - Neutralization (To A3J3)

Figure 8-1. Matching Network Module Assembly, Front View

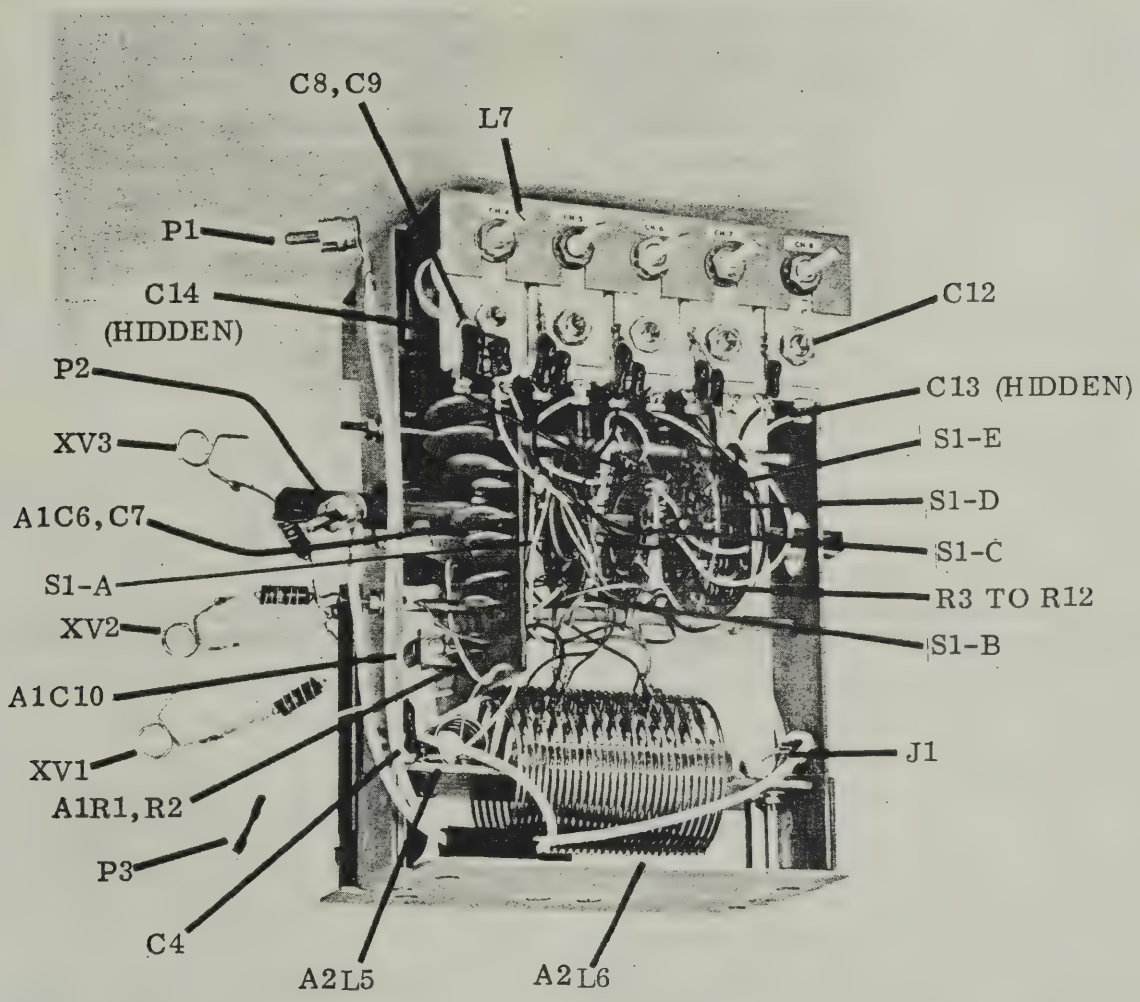


Figure 8-2. Matching Network Module Assembly, Bottom View

An indication of cathode current is obtained by measuring the voltage drop across cathode resistors R4, R7, and R10. The voltage appearing at the cathode connection of these resistors is applied to a metering circuit at the junction of isolating resistor R3, R6, and R9. The metering circuit consists of series limiting resistor R1, RF filter L7, C1 and C2, meter switch S1, and front panel meter M1. Cathode voltage is also applied to the PPC (A2) board, which will be discussed in subsequent paragraphs. An indication of 40 on the front panel meter corresponds to a total idling current of 75 mA, or 25 mA per tube. The slide switch S1 of A3 must be in the cathode current position to make the measurement but must be returned to the REL PWR position for normal operation.

The rf signal input to the power amplifier is applied via the three grid circuit parasitic suppressors, L1, L2, and L3. A screen bias voltage of +215 Vdc is applied to the power amplifier tubes by resistors R2, R5, and R8. The screen bias is obtained by dropping the +240 Vdc supply voltage through Zener diode VR1. This supply voltage is switched by antenna relay K1 so that it is present only when the Transceiver is keyed. Thus the power amplifier tubes have screen voltage only when the Transceiver is keyed.

9.5 POWER CONTROL (ACC/PPC) BOARD A3A2.

This board is shown pictorially in Figure 9-4. Peak power control of the amplifier is achieved by sampling the power amplifier grid voltage. Refer to schematic diagram Figure 9-7.

On normal voice signal drive, the grid voltage at the pa is always negative. When voice peaks occur which are sufficient to overdrive the grid, the positive envelope peaks cause grid current to flow. The resulting series of pulses is ac coupled to Q5 through blocking capacitor C12. The pulses are amplified in Q5 and the first transistor in U2, and they are integrated by fast attack/slow release emitter circuit R40, R41, C17 to provide a varying dc output proportional to the amount of overdrive. After amplification in the succeeding emitter follower, the ppc output is applied to the IF/Audio Board to limit the drive level. There is no adjustment for ppc, since it is self-regulating according to the capabilities of the pa stage to develop power without drawing grid current.

In the optional reduced power mode or in am mode if so desired, an artificial grid current is drawn by CR2-CR4 and CR9-CR10 to lower the peak output power. (See sheet 1 of the schematic diagram.) A positive voltage is applied to the base of Q1, in such modes, as determined by the setting of R8. The bias voltage set by Q1 and R10 is applied to the bottom of the diode string on the pa grid line. By regulating the threshold of conduction in this manner, the level at which artificial grid current begins to flow can be set. Thus, the ppc output can be made to limit the drive to any reduced level desired.

Auxiliary ppc, such as from a linear power amplifier, also can be fed into the base of Q1 to regulate the ppc threshold at a level below full drive. (Refer to schematic sheet 2.) Auxiliary ppc can be routed to Q1 through CR20, E15, and a jumper on the board. A current limit signal also may be applied on that line to Q1 if the pa cathode current exceeds a preset level. The right hand section of U2 (as shown on the schematic) acts as a comparator to provide an output if the current sample at pin 2 exceeds the level applied to pin 4 by R50. The resulting dc signal is amplified by Q6 to be fed in the auxiliary ppc input to Q1.

In FSK mode, the continuous tone signal ordinarily would not result in ppc on overdrive because no pulses are produced at Q5. For that reason, Q2 (shown on sheet 1) is employed in FSK mode to sense continous flow of grid current and thereby provide a ppc signal to Q5.

The carrier signal for am or reduced carrier mode is regulated in the IF/Audio Board as a result of an acc signal generated in the Power Control Board. (See schematic sheet 1.)

RF from the pa grid is amplified in Q3 and U1 and detected to provide a dc signal proportional to the carrier level. The R/C/CR circuit at pin 7 of U1 removes the effects of any modulation so that the acc signal responds to carrier only. The acc signal is then amplified by the remaining section of U1 and by Q4 to provide an acc signal to the IF/Audio Board.

The minimum amount of carrier which results in some acc output is established by the fixed dc level at emitter pin 3 of U1. The level corresponds to the level desired in reduced carrier (PCS) mode. In AM mode, the switch transistor (U1 pins 12-13-14) switches AM SET capacitor C9 into the circuit. The result is a reduction in the amount of rf signal being detected, thereby allowing the full AM carrier level to be produced in the IF/Audio Board.

9.6 CHANNEL TUNE STRIPS A3A3 THRU A3A12.

These boards in any combination up to ten provide the necessary tuned circuits for the transmit and receive functions. L2, C4, and L3, C8 are used in receive with L4, C11 added in transmit. Various strapping options are available.

a. Simplex boards - C5, C9 and C13 are added to the tuned circuit when the jumpers shown in Figure 9-5A are installed. The bands so formed are tabulated in Chapter 4. Also available at the input is L1, C1 and C2, the image trap option. The image trap is tuned to a frequency two times the IF frequency above the carrier frequency. C3, C4 and C5 values given in the parts list are modified when an image trap is supplied. Consult the manufacturer when an image trap is to be added in the field.

b. Duplex boards - Jumpers C to L2 and L3 are cut when the duplex board is to be operated simplex. Jumpers A to C6 and C10 are required for additional capacity across either C6 or C10. The combination of these jumpers allows K1 and K2 of the duplex switching board to switch the C6, C5 and C10, C9 combinations across L2 and L3 to lower the tuned frequency. A board with jumpers A and C is the basic duplex board, the bands of which are defined in Chapter 4. The basic board, however, may be converted to a basic simplex configuration and having component values of the simplex board by jumpers as shown in Figure 9-5A. Jumpers B thereby are used to split bands as indicated in Chapter 4. C6 and C10 are deleted in this configuration.

The dashed inductors across C5 and C9 (Figure 9-8) are for special applications where the duplex frequencies are very close. In this case C5 and C9 are replaced by an inductor to cancel out some of the capacity of C6 and C10.

C2 of the image trap has two locations as shown by the dual position arrows on the

schematic. For frequencies below 16 MHz, C2 is connected to the input, pin 2. Above 16 MHz, C2 is connected to pins 3 and 4. This provides the capability of greater selectivity of the front end at higher frequencies by minimizing the detuning effects of the image trap.

9.7 DUPLEX SWITCHING BOARD A3A13.

K1 and K2 are reed relays which on a transmit/receive command switch capacitors across the L2, L3 tuned circuits to lower the frequency. Jumper A is for ship stations (TX frequency lower) and jumper B is for shore stations (TX frequency higher).

RF AMPLIFIER MODULE ASSY

REF DESIG	DESCRIPTION	P/N
---	RF AMPLIFIER MODULE ASSEMBLY	
	6 channel	200300-6
	10 channel	200300-10
	10 channel Duplex	200300-10D
A1	RF Amplifier & Mixer PC Board Assembly	200370
A2	Power Control PC Board Assembly	210370
A3 thru A12	Channel Tuning PC Board Assembly, as listed below:	
	Simplex, 206/210	
	1.6-2.5 MHz	200390-1
	2.5-3.5 MHz	200390-2
	3.5-5.5 MHz	200390-3
	5.5-8.0 MHz	200390-4
	8.0-12.0 MHz	200390-5
	12.0-18.0 MHz	200390-6
	18.0-24.0 MHz	200390-7
	24.0-30.0 MHz	200390-8
	Duplex, 206M/210M	
	2.0-2.25 MHz	200393-1
	2.25-2.5 MHz	200393-2
	2.5-3.0 MHz	200393-3
	3.0-3.5 MHz	200393-4
	3.5-4.0 MHz	200393-5
	4.0-5.0 MHz	200393-6
	5.0-6.0 MHz	200393-7
	6.0-7.0 MHz	200393-8
	7.0-8.0 MHz	200393-9
	8.0-10.0 MHz	200393-10
	10.0-12.0 MHz	200393-11
	12.0-14.0 MHz	200393-12
	14.0-16.0 MHz	200393-13
	16.0-18.0 MHz	200393-14
	18.0-20.0 MHz	200393-15
	20.0-22.0 MHz	200393-16
A13	Duplex Switching PC Board Assembly	200387
A14	Automatic Carrier PC Board Assembly	200381
C1	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C2	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C3	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C4	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C5	Cap, cer, 0.1μF, +80-20%, 25 Vdcw	C11000

RF AMPLIFIER MODULE ASSY (CONT.)

REF DESIG	DESCRIPTION	P/N
C6	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C7	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C8	Cap, cer, 0.1μF, +80-20%, 25 Vdcw	C11000
C9	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C10	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C11	Cap, cer, 0.1μF, +80-20%, 25 Vdcw	C11000
C12	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C13	Cap, elect, 200μF, 350 Vdcw	C70004
C14	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C15	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C16	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C17	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C18	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C19	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C20	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
CR1-CR4	Diode, si, 1 Amp, 200V, 1N4003	CR4003
J1	Recept, 4 pin	J00200
J2	Recept, phono, bulkhead mtg	J00100
J3	Terminal, feedthru	E10004
J4	Not used	---
J5	Recept, phono, bulkhead mtg	J00100
L1	Choke, parasitic, 3t no. 22 on R30470	L20003
L2	Choke, parasitic, 3t no. 22 on R30470	L20003
L3	Choke, parasitic, 3t no. 22 on R30470	L20003
L4	Inductor, toroid	L32025
L5-L6	Not used	---
L7	Choke, rf, 47μH	L10470
P1	Plug, 8 pin, octal style	P00701
P2	Lug, female, quick-disconnect	P00155
R1	Res, comp, 10Ω, 5%, 1/4W	R20100
R2	Res, comp, 470Ω, 5%, 1/4W	R20471
R3	Res, comp, 100Ω, 5%, 1/4W	R20101
R4	Res, comp, 3.9Ω, 5%, 1/4W	R203R9
R5	Res, comp, 470Ω, 5%, 1/4W	R20471
R6	Res, comp, 100Ω, 5%, 1/4W	R20101
R7	Res, comp, 3.9Ω, 5%, 1/4W	R203R9
R8	Res, comp, 470Ω, 5%, 1/4W	R20471
R9	Res, comp, 100Ω, 5%, 1/4W	R20101
R10	Res, comp, 3.9Ω, 5%, 1/4W	R203R9
R11	Res, comp, 180Ω, 5%, 1/2W	R30181
R12	Res, comp, 100K, 5%, 1W	R40104

RF AMPLIFIER MODULE ASSY (CONT.)

REF DESIG	DESCRIPTION	P/N
R13	Not used	---
R14	Res, ww, 12Ω, 12W	R90002
S1	Switch, slide, dpdt	S00202
S2	Switch wafer, detent assy	S10507
S2-B	Switch wafer, 1 pole, 11 pos, shorting	S10100
S2-C	Switch wafer, 1 pole, 11 pos, shorting	S10100
S2-D	Switch wafer, 1 pole, 11 pos, shorting	S10100
S2-E	Switch wafer, 1 pole, 11 pos, shorting	S10100
S2-F	Switch wafer, 1 pole, 11 pos, shorting	S10100
S2-G	Switch wafer, 1 pole, 11 pos, shorting	S10100
S2-H	Switch wafer, 1 pole, 11 pos, shorting	S10100
S3	Switch, slide, dpdt, slot, unmarked	S00201
V1	Tube, electron, 6146B	V6146B
V2	Tube, electron, 6146B	V6146B
V3	Tube, electron, 6146B	V6146B
VR1	Diode, zener, 33V, 5%, 10W, 1N1363A	VR1363
XA3	Connector, pc, 22 pin	X00803
XA4	Connector, pc, 22 pin	X00803
XA5	Connector, pc, 22 pin	X00803
XA6	Connector, pc, 22 pin	X00803
XA7	Connector, pc, 22 pin	X00803
XA8	Connector, pc, 22 pin	X00803
XA9	Connector, pc, 22 pin	X00803
XA10	Connector, pc, 22 pin	X00803
XA11	Connector, pc, 22 pin	X00803
XA12	Connector, pc, 22 pin	X00803
XA13	Connector, pc, 22 pin	X00803
XV1	Socket, octal type, 8 pins	X00701
XV2	Socket, octal type, 8 pins	X00701
XV3	Socket, octal type, 8 pins	X00701
---	Ferrite bead	FL0003

RF AMPLIFIER & MIXER PC BD ASSY A1

REF DESIG	DESCRIPTION	P/N
---	RF AMPLIFIER & MIXER PC BOARD ASSY	200370
C1	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C2	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C3	Cap, mica, 7pF, 5%, 100 Vdcw	C04070
C4	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C5	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C6	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C7	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C8	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C9	Cap, mica, 510pF, 5%, 500 Vdcw	C06511
	(for 1.4 MHz IF, 560pF)	(C06561)
C10	Cap, mica, 12pF, 5%, 500 Vdcw	C05120
	(for 1.4 MHz IF, 15pF)	(C05150)
C11	Cap, mica, 510pF, 5%, 500 Vdcw	C06511
	(for 1.4 MHz IF, 560pF)	(C06561)
C12	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C13	Cap, tant, 0.1μF, 20%, 35 Vdcw	C41046
C14	Cap, mica, 1000pF, 5%, 500 Vdcw	C06102
C15	Cap, mica, 510pF, 5%, 500 Vdcw	C06511
	(for 1.4 MHz IF, 560pF)	(C06561)
C16	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C17	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C18	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C19	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C20	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C21	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C22	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C23	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C24	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C25	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C26	Not used	---
C27	Cap, tant, 0.1μF, 20%, 35 Vdcw	C41046
C28	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C29	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C30	Cap, mica, 270pF, 5%, 500 Vdcw	C05271
C31	Cap, cer, 0.1μF, +80-20%, 25 Vdcw	C11000
C32	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C33	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C34	Cap, mica, 680pF, 5%, 500 Vdcw	C06681
C35	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C36	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C37	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C38	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C39	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C40	Cap, cer, feedthru, 470pF, 10%	C00003
C41	Cap, cer, .0047μF, 10%, 500 Vdcw	C10047

RF AMPLIFIER & MIXER PC BD ASSY A1 (CONT.)

REF DESIG	DESCRIPTION	P/N
C42	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C43	Not used	---
C44	Cap, tant, 0.1μF, 20%, 35 Vdcw	C41046
C45	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C46	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C47	Cap, mica, 820pF, 5%, 500 Vdcw	C06821
C48	Cap, mica, 680pF, 5%, 500 Vdcw	C06681
C49	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C50	Cap, mica, 390pF, 5%, 500 Vdcw	C05391
C51	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
CR1	Diode, si, signal, 1N4148	CR4148
CR2	Diode, si, 1 Amp, 200V, 1N4003	CR4003
CR3	Diode, si, signal, 1N4148	CR4148
CR4	Diode, si, signal, 1N4148	CR4148
K1	Relay, 6 pdt, 12 Vdc	K10001
L1	Choke, rf, 0.47μH	L10R47
L2	Choke, rf, 1 mH	L10102
L3	Choke, rf, 1 mH	L10102
L4	Choke, rf, 1 mH	L10102
L5	Choke, rf, 100μH	L10101
L6	Choke, rf, 1 mH	L10102
L7	Choke, rf, 100μH	L10101
Q1	Transistor, dual gate mosfet, 40823	Q40823
Q2	Transistor, npn, 2N5179	Q51790
Q3	Transistor, dual gate mosfet, 40823	Q40823
R1	Res, comp, 560Ω, 5%, 1/4W	R20561
R2	Res, comp, 470K, 5%, 1/4W	R20474
R3	Res, comp, 56K, 5%, 1/4W	R20563
R4	Res, comp, 100K, 5%, 1/4W	R20104
R5	Res, comp, 470K, 5%, 1/4W	R20474
R6	Res, comp, 4.7K, 5%, 1/4W	R20472
R7	Res, comp, 33K, 5%, 1/4W	R20333
R8	Res, comp, 220Ω, 5%, 1/4W	R20221
R9	Res, comp, 22Ω, 5%, 1/4W	R20220
R10	Res, comp, 220Ω, 5%, 1/4W	R20221
R11	Res, comp, 6.8K, 5%, 1/4W	R20682
R12	Res, comp, 3.3K, 5%, 1/4W	R20332
R13	Res, comp, 82Ω, 5%, 1/4W	R20820
R14	Res, comp, 220Ω, 5%, 1/4W	R20221
R15	Res, comp, 33K, 5%, 1/4W	R20333
R16	Res, comp, 180K, 5%, 1/4W	R20184

RF AMPLIFIER & MIXER PC BD ASSY A1 (CONT.)

REF DESIG	DESCRIPTION	P/N
R17	Res, comp, 68K, 5%, 1/4W	R20683
R18	Res, comp, 39K, 5%, 1/4W	R20393
R19	Res, comp, 270Ω, 5%, 1/4W	R20271
R20	Res, comp, 22K, 5%, 1/4W	R20223
R21	Pot, trim, pc, 100Ω	R88101
R22	Res, comp, 1.5K, 5%, 1/4W	R20152
R23	Res, comp, 27Ω, 5%, 1/4W	R20270
R24	Res, comp, 27Ω, 5%, 1/4W	R20270
R25	Res, comp, 470Ω, 5%, 1/4W	R20471
R26	Res, comp, 1K, 5%, 1/4W	R20102
R27	Res, comp, 1K, 5%, 1/4W	R20102
R28	Res, comp, 100Ω, 5%, 1/4W	R20101
R29	Res, comp, 15K, 5%, 1/4W	R20153
R30	Res, comp, 15K, 5%, 1/4W	R20153
R31	Res, comp, 470Ω, 5%, 1/4W	R20471
R32	Res, comp, 470Ω, 5%, 1/4W	R20471
R33	Res, comp, 3.9K, 5%, 1/4W	R20392
R34	Res, comp, 2.2K, 5%, 1/4W	R20222
R35	Res, comp, 1.2K, 5%, 1/4W	R20122
R36	Res, comp, 3.9K, 5%, 1/4W	R20392
R37	Res, comp, 470Ω, 5%, 1/4W	R20471
R38	Res, comp, 180K, 5%, 1/4W	R20184
R39	Res, comp, 39K, 5%, 1/4W	R20393
R40	Not used	---
R41	Res, comp, 47K, 5%, 1/4W	R20473
R42	Res, comp, 47K, 5%, 1/4W	R20473
R43	Res, comp, 100Ω, 5%, 1/4W	R20101
R44	Res, comp, 7.5K, 5%, 1W	R40752
R45	Res, comp, 820Ω, 5%, 2W	R50821
R46	Not used	---
R47	Res, comp, 27Ω, 5%, 1/4W	R20270
R48	Res, comp, 100Ω, 5%, 1/4W	R20101
R49	Res, comp, 100Ω, 5%, 1/4W	R20101
T1	Transformer, if, 1500 kHz	T10004
T2	Transformer, if, 1500 kHz	T10004
T3	Transformer, if, 1500 kHz	T10004
T4	Transformer, 2-30 MHz, broadband	T10200
T5	Transformer, 2-30 MHz, broadband	T10200
U1	IC, modulator, MC1596G	U1596G
U2	IC, rf ampl, CA-3028A	U3028A
V1	Tube, electron, 12DZ6	V12DZ6
V2	Tube, electron, 12BY7	V12BY7

RF AMPLIFIER & MIXER PC BD ASSY A1 (CONT.)

REF DESIG	DESCRIPTION	P/N
XK1	Socket, relay	X00300
XV1	Socket, tube, 7 pin	X00200
XV2	Socket, tube, 9 pin	X00201

CH TUNING PC BD ASSY A3-A12 (CONT.)

REF DESIG	DESCRIPTION	P/N
	3.5-5.5 MHz	200390-3
C3	Cap, mica, 68pF, 5%, 500 Vdcw	C05680
C4	Cap, mica, 330pF, 5%, 500 Vdcw	C05331
C5	Cap, mica, 68pF, 5%, 500 Vdcw	C05680
C7	Cap, mica, 390pF, 5%, 500 Vdcw	C05391
C8	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C9	Cap, mica, 100pF, 5%, 500 Vdcw	C05101
C11	Cap, mica, 27pF, 5%, 500 Vdcw	C05270
C12	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C13	Cap, mica, 51pF, 5%, 500 Vdcw	C05510
L2	Inductor, var, pc, 2.0-5.3μH	L30004
L3	Inductor, var, pc, 2.0-5.3μH	L30004
L4	Inductor, var, pc, 7.5-17μH	L31006
R2	Pot, trim, pc, min, 10K	R89103
R3	Res, comp, 2.7K, 5%, 1/4W	R20272
R5	Res, comp, 6.8K, 5%, 1/4W	R20682
	5.5-8.0 MHz	200390-4
C3	Cap, mica, 30pF, 5%, 500 Vdcw	C05300
C4	Cap, mica, 120pF, 5%, 500 Vdcw	C05121
C5	Cap, mica, 39pF, 5%, 500 Vdcw	C05390
C7	Cap, mica, 150pF, 5%, 500 Vdcw	C05151
C8	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C9	Cap, mica, 39pF, 5%, 500 Vdcw	C05390
C11	Cap, mica, 30pF, 5%, 500 Vdcw	C05300
C12	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C13	Cap, mica, 30pF, 5%, 500 Vdcw	C05300
L2	Inductor, var, pc, 2.0-5.3μH	L30004
L3	Inductor, var, pc, 2.0-5.3μH	L30004
L4	Inductor, var, pc, 3.5-8.5μH	L31005
R2	Pot, trim, pc, min, 10K	R89103
R3	Res, comp, 2.7K, 5%, 1/4W	R20272
R4	Res, comp, 22K, 5%, 1/4W	R20223
R5	Res, comp, 6.8K, 5%, 1/4W	R20682

CH TUNING PC BD ASSY A3-A12 (CONT.)

REF DESIG	DESCRIPTION	P/N
	8.0-12.0 MHz	200390-5
C3	Cap, mica, 30pF, 5%, 500 Vdcw	C05300
C4	Cap, mica, 130pF, 5%, 500 Vdcw	C05131
C5	Cap, mica, 33pF, 5%, 500 Vdcw	C05330
C7	Cap, mica, 120pF, 5%, 500 Vdcw	C05121
C8	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C9	Cap, mica, 39pF, 5%, 500 Vdcw	C05390
C11	Cap, mica, 12pF, 5%, 500 Vdcw	C05120
C12	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C13	Cap, mica, 39pF, 5%, 500 Vdcw	C05390
L2	Inductor, var, pc, 0.9-2.3μH	L30003
L3	Inductor, var, pc, 0.9-2.3μH	L30003
L4	Inductor, var, pc, 1.7-3.9μH	L31004
R1	Res, comp, 15K, 5%, 1/4W	R20153
R2	Pot, trim, pc, min, 10K	R89103
R3	Res, comp, 2.7K, 5%, 1/4W	R20272
R4	Res, comp, 10K, 5%, 1/4W	R20103
R5	Res, comp, 10K, 5%, 1/4W	R20103
	12.0-18.0 MHz	200390-6
C3	Cap, mica, 15pF, 5%, 500 Vdcw	C05150
C4	Cap, mica, 30pF, 5%, 500 Vdcw	C05300
C5	Cap, mica, 33pF, 5%, 500 Vdcw	C05330
C7	Cap, mica, 22pF, 5%, 500 Vdcw	C05220
C8	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C9	Cap, mica, 33pF, 5%, 500 Vdcw	C05330
C12	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C13	Cap, mica, 39pF, 5%, 500 Vdcw	C05390
L2	Inductor, var, pc, 0.9-2.3μH	L30003
L3	Inductor, var, pc, 0.9-2.3μH	L30003
L4	Inductor, var, pc, 0.9-2.1μH	L31003
R2	Pot, trim, pc, min, 10K	R89103
R3	Res, comp, 2.7K, 5%, 1/4W	R20272
R4	Res, comp, 22K, 5%, 1/4W	R20223

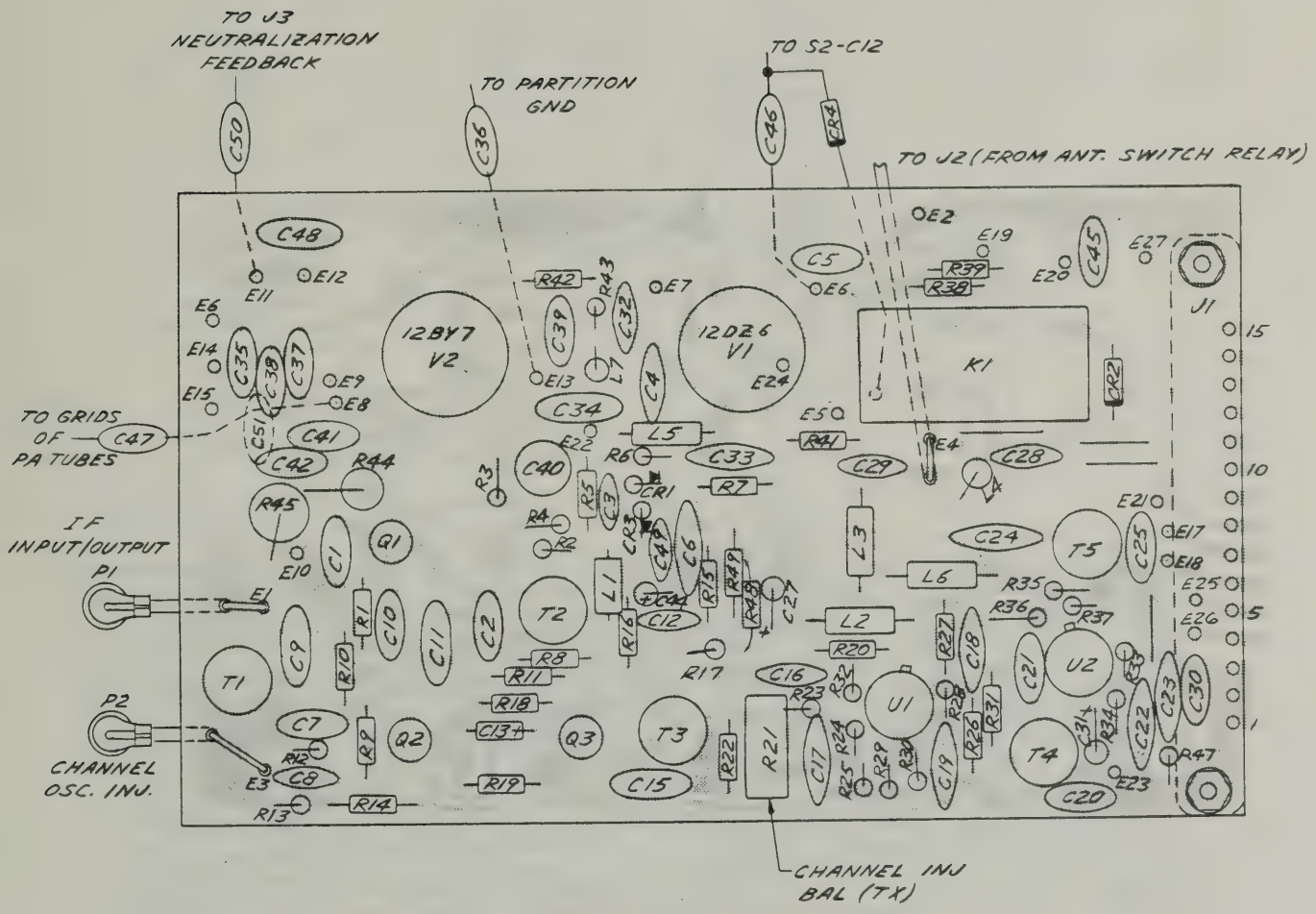


Figure 9-3. RF Amplifier Mixer PC Board Assembly A3A1

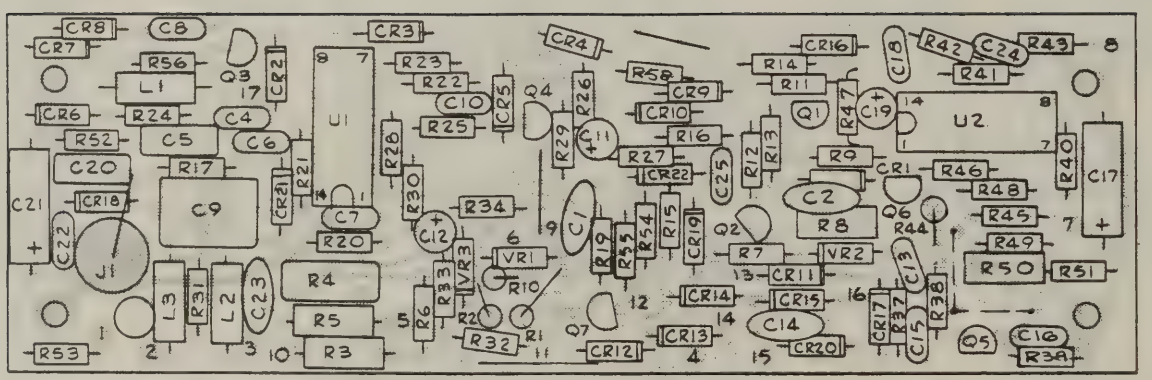
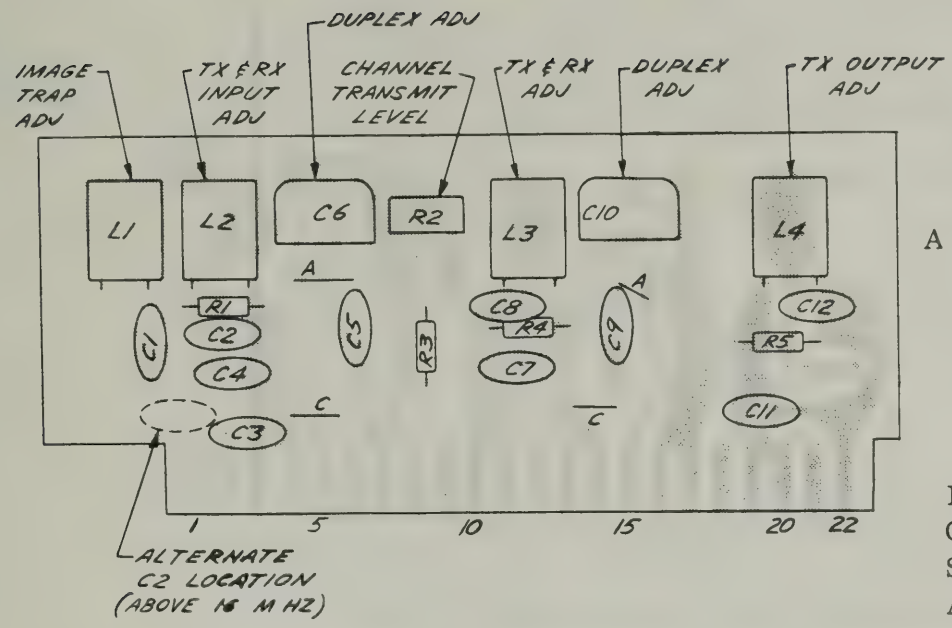
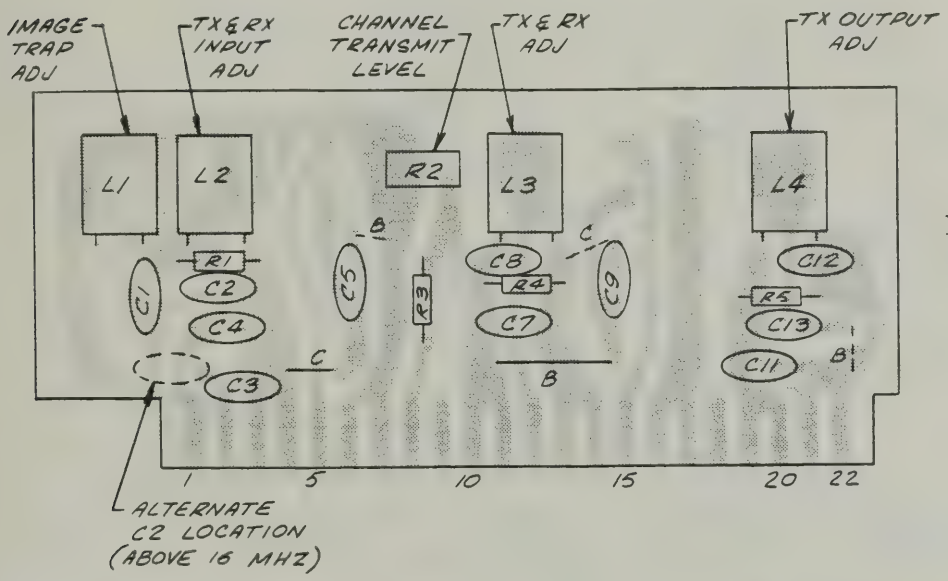


Figure 9-4. Power Control PC Board Assembly A3A2



A - SIMPLEX

Figure 9-5. Channel Tune Strips A3A3-A3A12.



B - DUPLEX

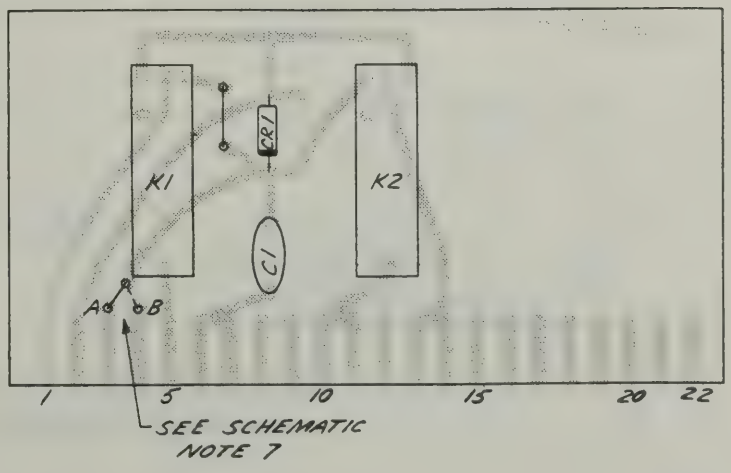


Figure 9-6. Duplex Switching Board A3A13

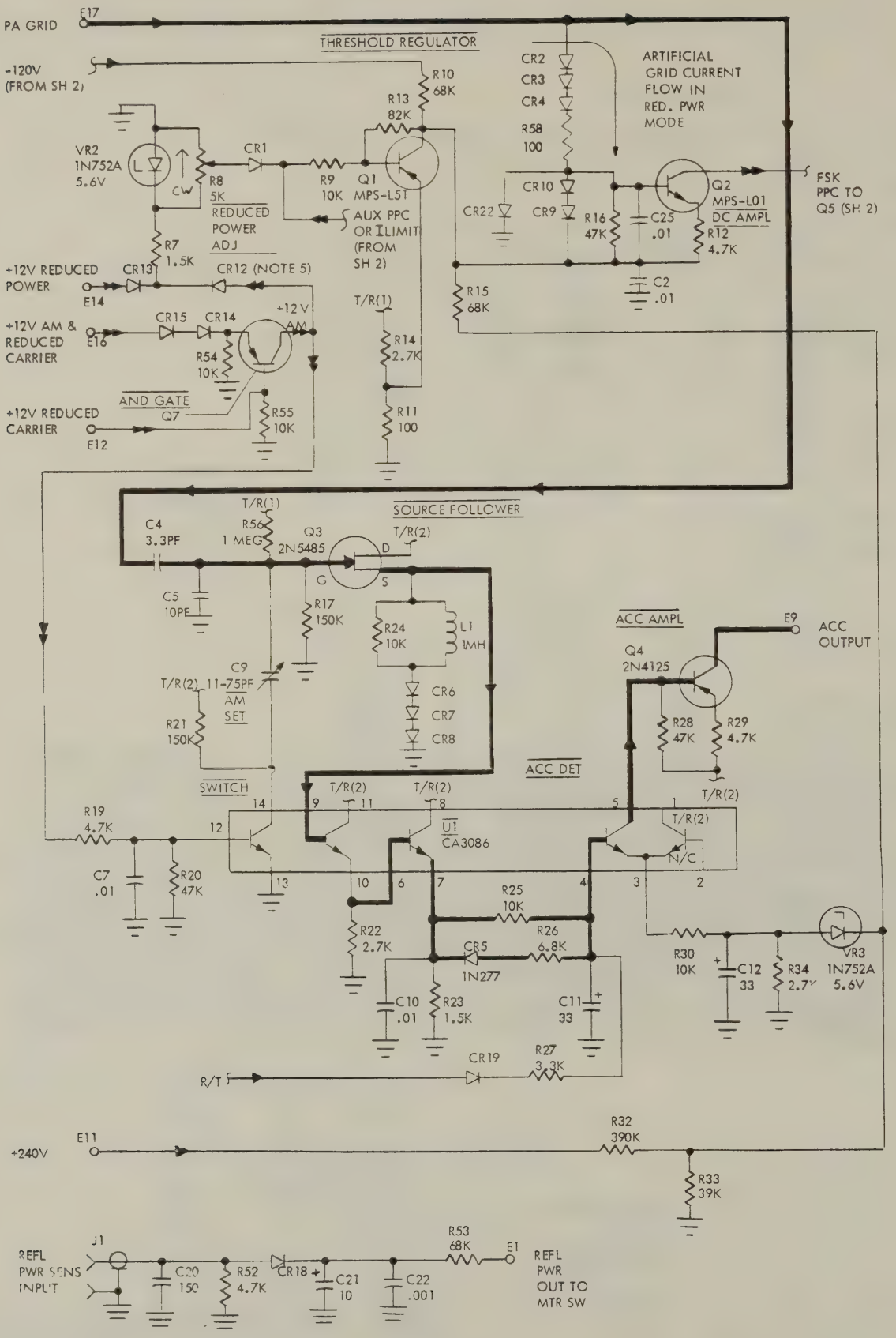
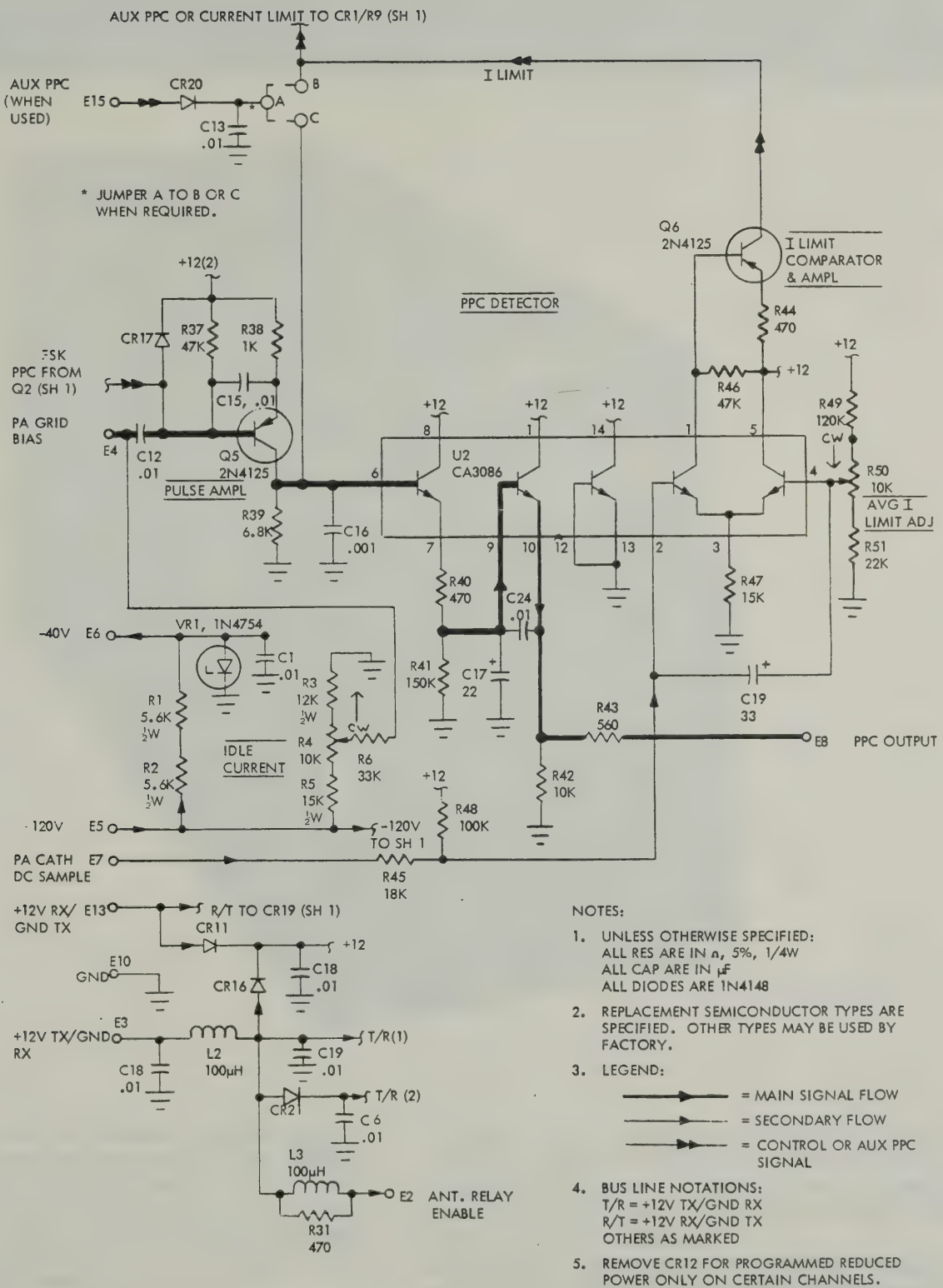


Figure 9-7. Power Control (ACC/PPC) Board Assy A3A2, Schematic Diagram (Sheet 1 of 2)



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   ALL RES ARE IN Ω, 5%, 1/4W
   ALL CAP ARE IN µF
   ALL DIODES ARE 1N4148
2. REPLACEMENT SEMICONDUCTOR TYPES ARE SPECIFIED. OTHER TYPES MAY BE USED BY FACTORY.
3. LEGEND:
   - = MAIN SIGNAL FLOW
   - = SECONDARY FLOW
   - = CONTROL OR AUX PPC SIGNAL
4. BUS LINE NOTATIONS:
   T/R = +12V TX/GND RX
   R/T = +12V RX/GND TX
   OTHERS AS MARKED
5. REMOVE CR12 FOR PROGRAMMED REDUCED POWER ONLY ON CERTAIN CHANNELS.

Figure 9-7. Power Control (ACC/PPC) Board Assy A3A2, Schematic Diagram (Sheet 2 of 2)

MOTOROLA INC.

Government Electronics Group

200 WATT UHF AM/FM POWER AMPLIFIER AM-7175/URC

81-5972

DESCRIPTION

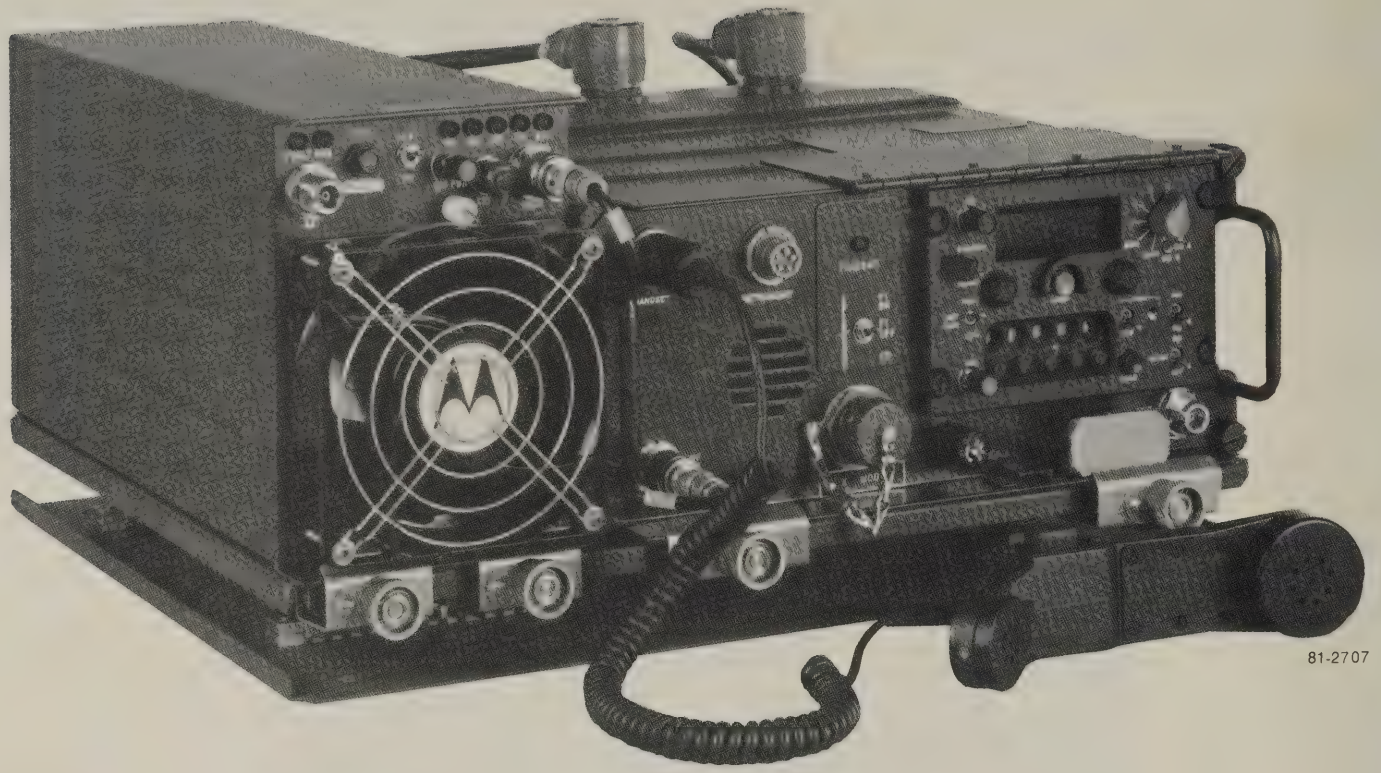
The AM-7175/URC is an all solid state, highly-reliable unit providing up to 200 watts of power output in the 225-400 MHz band. This unit is compatible with a variety of modulation schemes including AM, FM, or CW. Use of broadband techniques allows compatibility with any UHF transmitter having a carrier output of 2-25 watts and an output impedance of 50 ohms.

Designed for use in the demanding land vehicle environment, this amplifier is extremely rugged and has a calculated 5000 hour mean time between failure (MTBF).

Variable AM/FM output power is achieved by a rotary knob on the front panel with proportional LED output indicators. Maximum AM output is 50 watts carrier, 200 watts peak. Maximum FM output power is 200 watts.

The amplifier contains a thermostatically-controlled fan for use in high temperature environments or where continuous operation is necessary.

Weighing 22 pounds, the 200 watt amplifier is sealed in a weather-resistant housing to permit continuous operation in virtually all weather conditions. Loss of one of the dual output power amplifiers is automatically detected and continuous operation at reduced power is allowed. If a major failure occurs, the unit will go into a bypass mode.



Power Amplifier mounted with URC-101 Radio

FEATURES

- AM, FM, or CW
- 50-200 watt power output-FM (adjustable)
- 12.5-50 watt carrier power output-AM (adjustable)
- Front panel AM/FM power output control
- Designed for continuous operation
- Capable of being remotely controlled
- All solid state circuits
- No tuning required
- Airborne/vehicular configurations
- Automatic or key line control with logic compatibility
- Double thermal protection
- Triple ALC loop failure detection
- Weather-resistant housing
- Module failure will cause automatic switch-over to bypass mode

TECHNICAL CHARACTERISTICS

Frequency	225-400 MHz
Input	2-25 Watts
Output (50Ω)	200 Watts Max. FM 50 Watts Max. AM (Carrier)
Input impedance	50Ω
Harmonics	45 db below carrier
Load VSWR	2:1
Amplifier Distortion	AM 10% @ 70% Mod.
Primary power	22-32 VDC @ 30 amps
Size	13.5 × 7 × 5 inches
Weight	22 lbs
Operating Temperature	−20°C to +55°C
MTBF	5000 hrs

MOTOROLA INC.
Government Electronics Group

COMMUNICATIONS DIVISION
Tactical Communications Office
8201 E. McDowell Road, P.O Box 1417, Scottsdale, AZ 85252
(602) 949-2798

72/E29b

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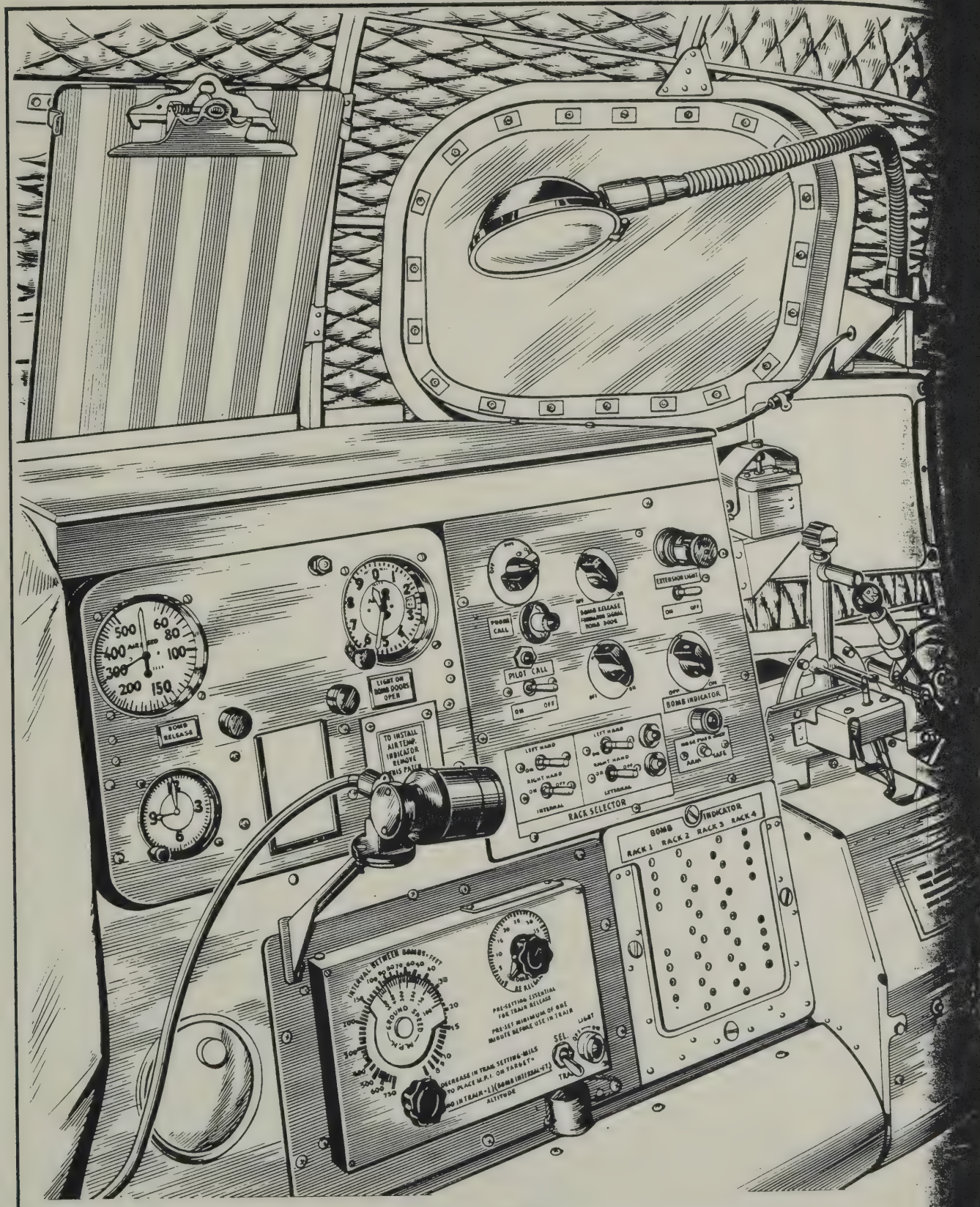
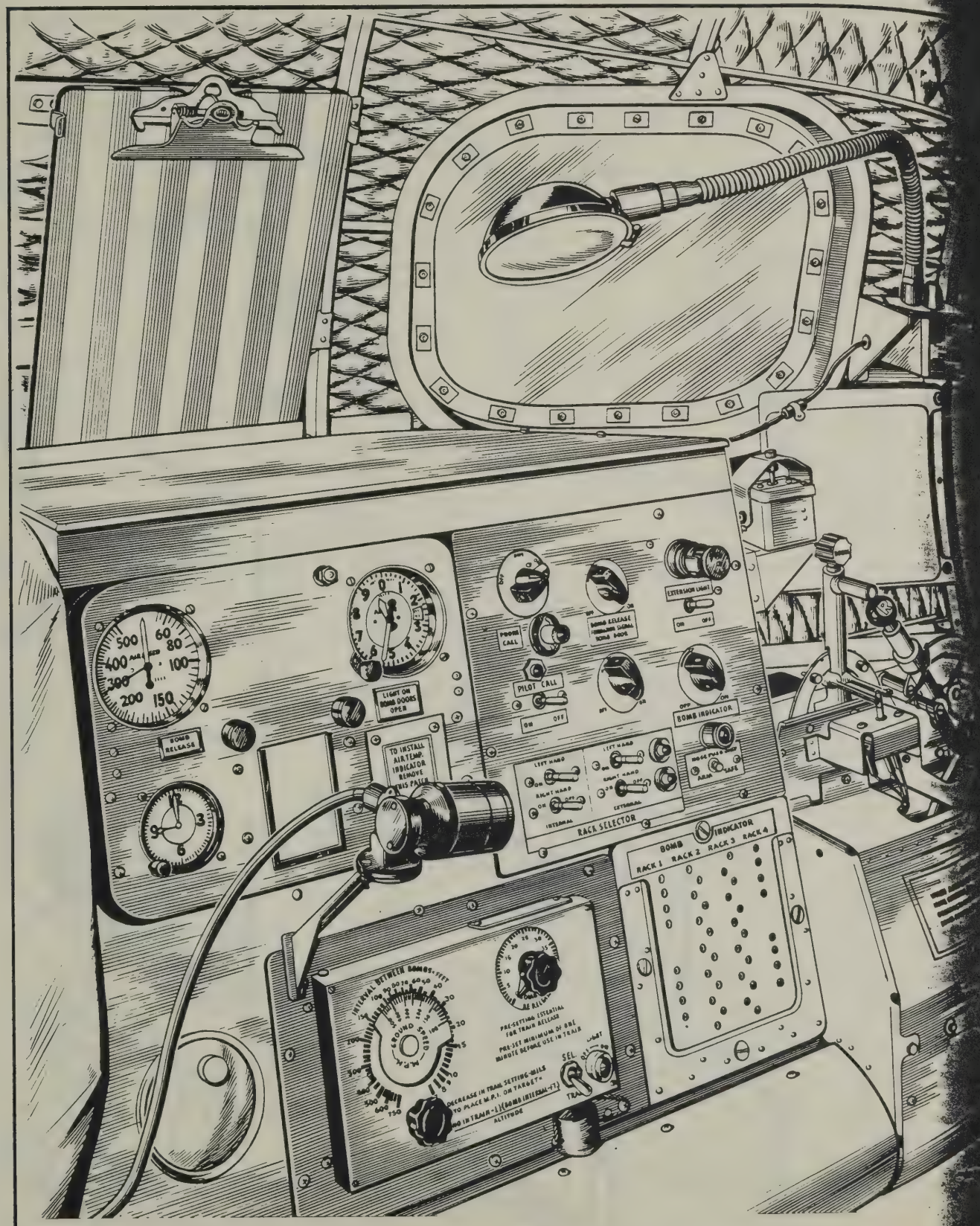


B-17F

BOMBARDIER'S PANEL

ARMAMENT



B-17F

BOMBARDIER'S PANEL

ARMAMENT

FUSELAGE

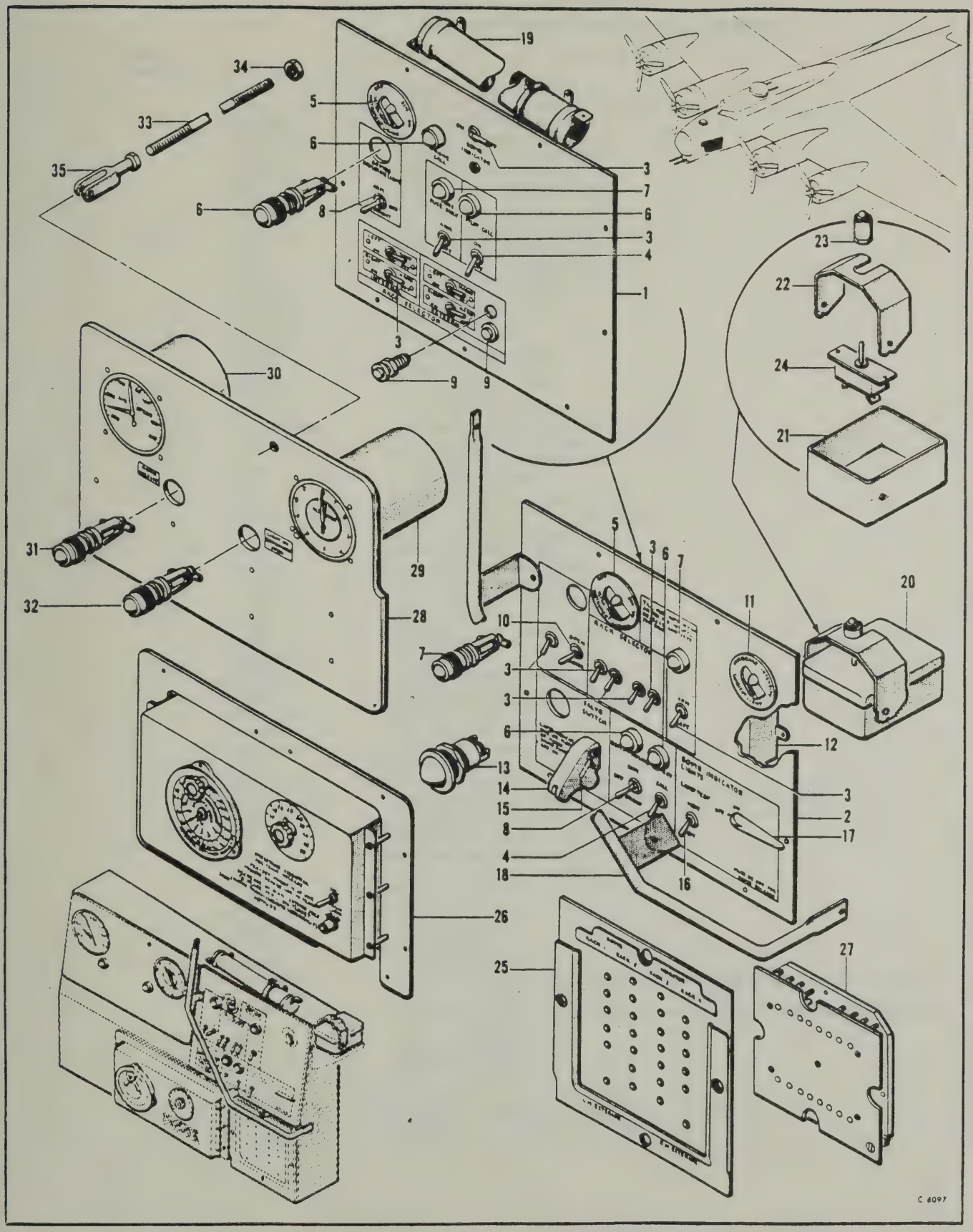


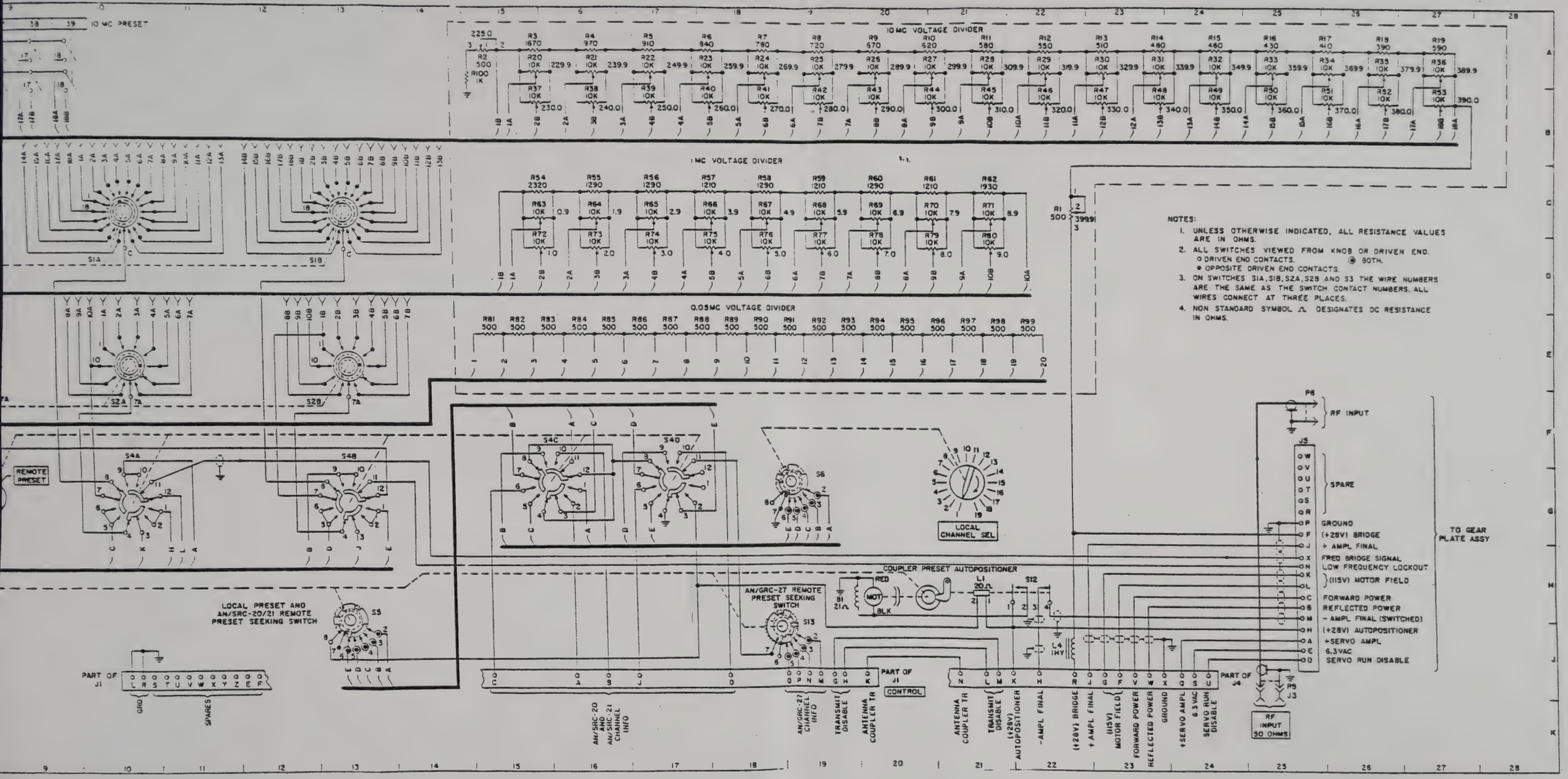
Figure 116—Bomber's Control and Instrument Panel

FUSELAGE

Bombers Control and Instrument Panel

Figure & Index No.	Part Number	1 2 3 4 5 6 7 Nomenclature	Usage Code	Units Per Assy.
		Bombers Control and Instrument Panel		
	55-7351	Installation—Bombers control panel (see fig. 110)	All	NP
	6-12609-7	Panel Assembly—Bombers control	HA	1
	6-12609-6	Panel Assembly—Bombers control	SH	1
	6-12609-12	Panel Assembly—Bombers control	OI	1
	6-12609-13	Panel Assembly—Bombers control	XI	1
	6-12609-11	Panel Assembly—Bombers control	QM	1
	6-12609-14	Panel Assembly—Bombers control	EO	1
	6-12609-15	Panel Assembly—Bombers control	PQ	1
116-1	6-12607-7	Plate Assembly—Bombers control	HA	1
2	9-7342	Plate Assembly—Bombers control	XH	1
	9-7342-2	Plate Assembly—Bombers control	QM	1
	9-7342-4	Plate Assembly—Bombers control	EO	1
	9-7342-6	Plate Assembly—Bombers control	PQ	1
3	AN3022-2B	Switch—Single pole toggle	All	6
4	AN3022-8B	Switch—Single pole toggle	All	1
5	1-22746-1	Control Assembly	QB	1
6	42B3593-2	Lamp Assembly (amber)	All	3
7	42B3593-1	Lamp Assembly (red)	All	2
8	39A2512	Switch Assembly (Type C-2)	All	1
9	40A7419-1	Lamp Assembly	HA	2
10	AN3022-7B	Switch—Single pole toggle	JI	1
11	NO NUMBER	Rheostat (Spec 94-32229D) (Type O-1C) GFE	XM	1
12	CA275X	Condenser (P.R. Mallory and Co.)	OI	1
13	275	Lamp Assembly (Drake Mfg. Co.)	JI	1
14	3-24506	Guard—Toggle switch	JI	1
15	39A2511	Switch (Type C-1)	JI	1
16	8715	Switch Assembly (Cutler-Hammer)	JI	1
17	TLS26	Switch Assembly (P. R. Mallory and Co.)	JI	1
18	14-3740	Rail Assembly—Panel guard	AL	1
19	0956	Resistor (Ohmite Mfg. Co.)	JI	1
20	3-12023	Shield Assembly—Bomb release	WM	1
	3-12023-4	Shield Assembly—Bomb release	PQ	1
21	41-9981-1	Shield Assembly—Junction box	XM	1
22	1-19823	Guard Assembly	XM	1
23	24-1164	Extension—Lever (Cutler-Hammer)	XM	1
	1-29254	Spring—Latch	XM	1
	21-2366-32-11	Washer	XM	2
24	AN3022-7B	Switch—Single pole toggle	XM	1
	56-7180	Panel Assembly—Bomb load indicator	HA	1
	56-7180-504	Panel Assembly—Bomb load indicator	JI	1
25	56-7180-501	Plate Assembly	HA	1
	56-7180-505	Plate Assembly	JI	1
	39A3906-2	Lamp—Warning signal GFE	All	59
26	6-9216-7	Panel Assembly—Bomb interval switch	UD	1
	6-9216-5	Panel Assembly—Bomb interval switch	IK	1
	NO NUMBER	Control Assembly—Bomb release (Spec 93-24717) (Type B-3) GFE	UD	1
	NO NUMBER	Control Assembly—Bomb release (Spec 93-24630) (Type B2A) GFE	IK	1
27	6-10107	Panel Assembly—Bomb indicator	HA	1
	1110	Contact Assembly (Korry Mfg. Co.)	HA	42
	6-15547	Panel Assembly—Bomb indicator	JI	1
	1110	Contact Assembly (Korry Mfg. Co.)	JI	26
	54-1611	Installation—Bombers instrument panel	All	NP
	54-1611-706	Panel Assembly	HA	1
	54-1611-707	Panel Assembly	JI	1
28	6-13846	Panel Assembly	HA	1
	6-13846-11	Panel Assembly	JI	1
29	AN5760-2	Altimeter—Pressure GFE	All	1
30	NO NUMBER	Indicator—Air speed (Spec 94-27335) (Type F-2) (Spec 94-27952A Type C-14 optional) GFE	MA	1
	NO NUMBER	Indicator—Air speed (Spec 94-27916) (Type F-1) (Spec 94-27335 Type F-2 optional) GFE	RI	1
31	42B3593-1	Lamp Assembly (red)	HA	1
32	42B3593-2	Lamp Assembly (amber)	HA	1
	74-1611-707	Lamp GFE	HA	2
33	74-1611-1	Rod	All	1
34	AN316-4R	Nut—Aircraft	All	2
35	AN486-3	Clevis—Rod end adjusting	All	1
	41-6813	Cup—Bolt	All	1
	34A1766D2	Washer	All	8

SRA-33



NOTES:

1. UNLESS OTHERWISE INDICATED, ALL RESISTANCE VALUES ARE IN OHMS.
2. ALL SWITCHES VIEWED FROM KNOB OR DRIVEN END.
   ○ DRIVEN END CONTACTS. ◉ BOTH.
   ● OPPOSITE DRIVEN END CONTACTS.
3. ON SWITCHES S1A, S1B, S2A, S2B AND S3 THE WIRE NUMBERS ARE THE SAME AS THE SWITCH CONTACT NUMBERS. ALL WIRES CONNECT AT THREE PLACES.
4. NON STANDARD SYMBOL ⎍ DESIGNATES DC RESISTANCE IN OHMS.

Figure 5-27. Antenna Coupler CU-1131/SRA-33 Through CU-1134/SRA-33, Front Panel Assembly, Schematic Diagram

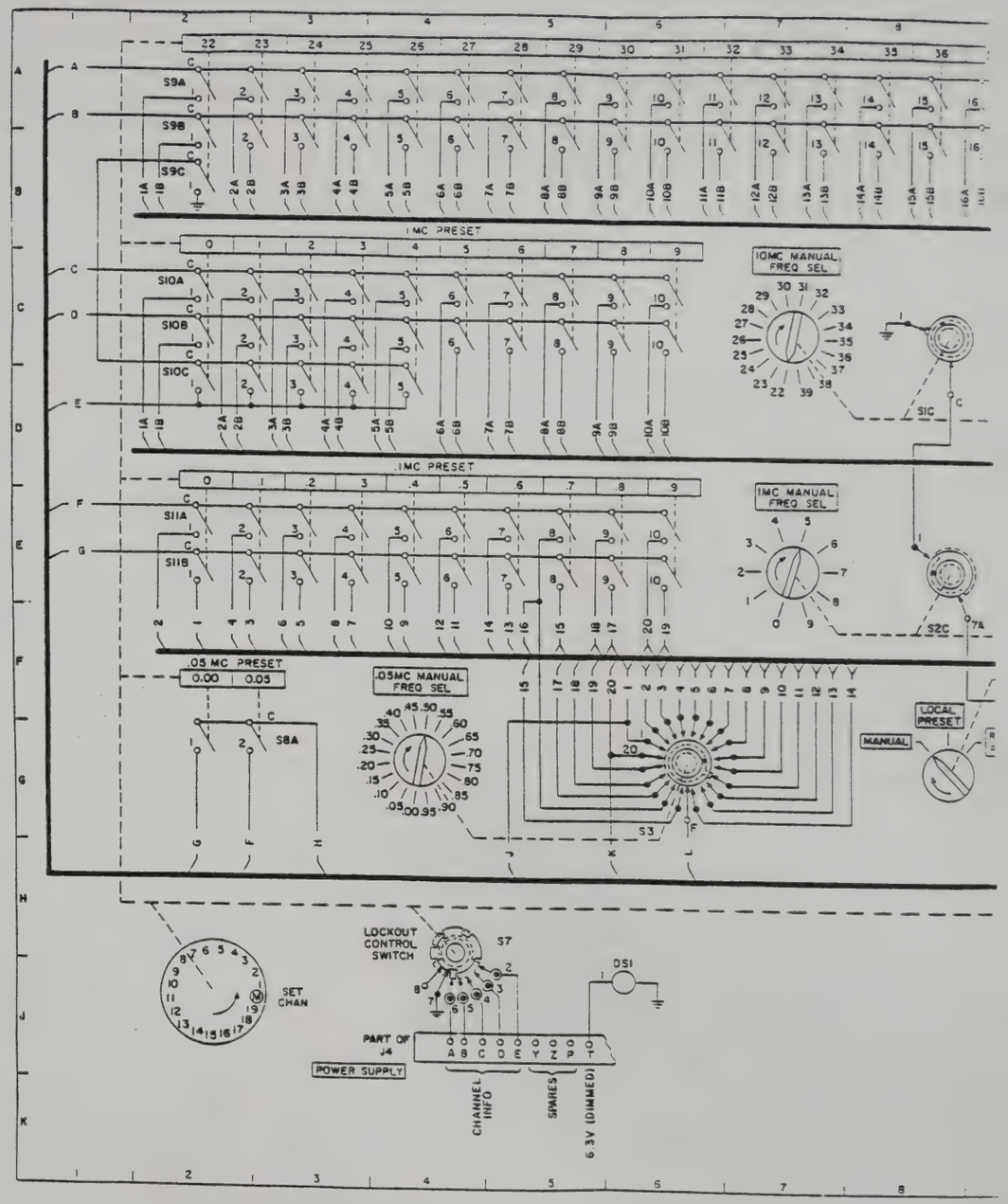
SRA-33

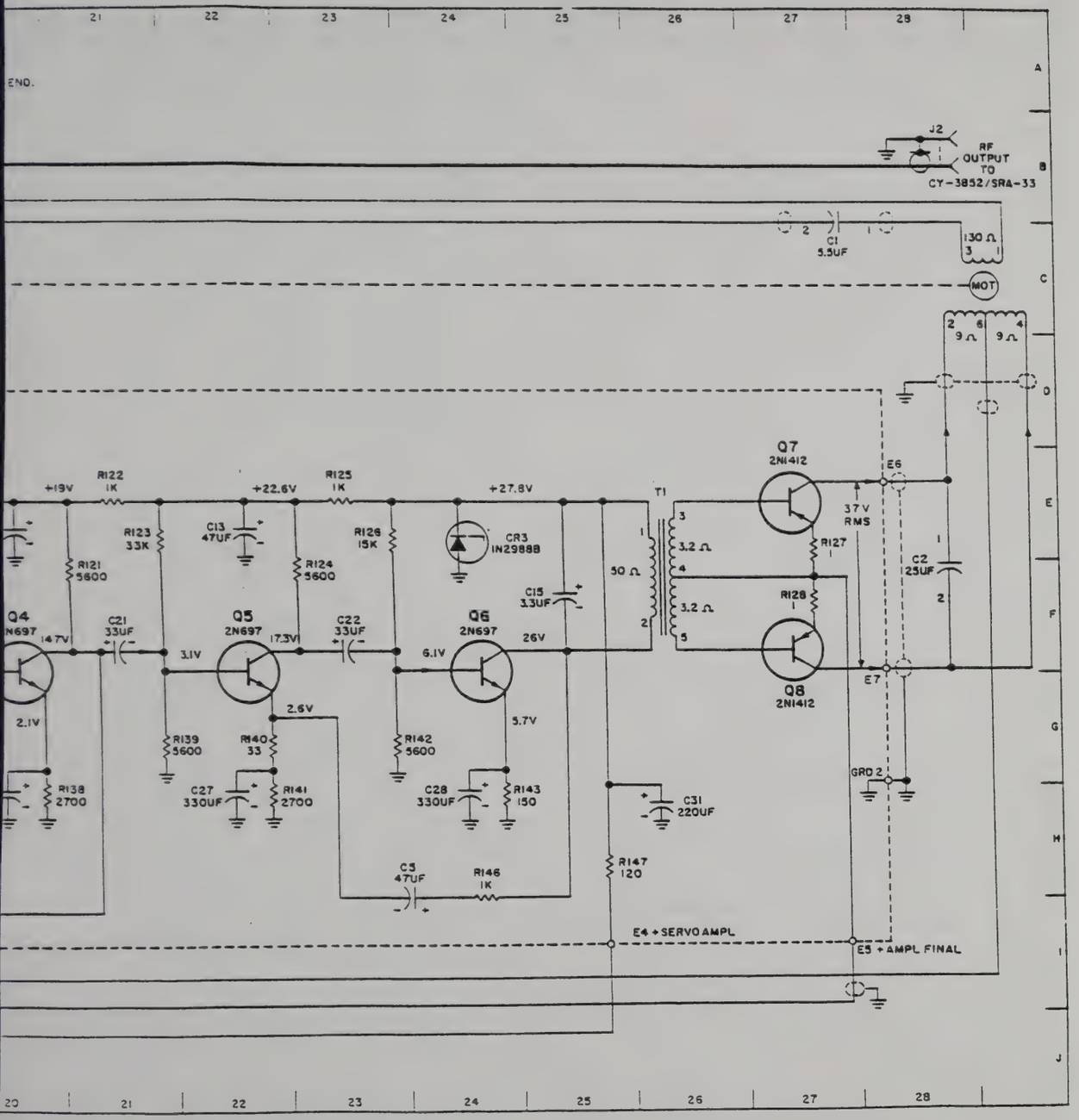
SRA-33
Info

PART LOCATION INDEX

REF DESIG	LOC	REF DESIG	LOC	REF DESIG	LOC
B1	19H	R32	24A	R80	21D
DS1	6H	R33	25A	R81	15E
J1	20J, 10J	R34	26A	R82	15E
* J2		R35	26A	R83	16E
J3	25J	R36	27A	R84	16E
J4	24J, 4J	R37	15B	R85	16E
J5	25F	R38	16B	R86	17E
L1	21H	R39	17B	R87	17E
* L2		R40	18B	R88	17E
* L3		R41	18B	R89	18E
L4	22J	R42	19B	R90	18E
P1		R43	20B	R91	19E
P2		R44	21B	R92	19E
P3		R45	21B	R93	19E
P4		R46	22B	R94	20E
P5	25J	R47	23B	R95	20E
P6	25F	R48	23B	R96	21E
R1	22C	R49	24B	R97	21E
R2	15A	R50	25B	R98	21E
R3	15A	R51	26B	R99	22E
R4	16A	R52	26B	R100	15A
R5	17A	R53	27B	S1A	10D
R6	18A	R54	15C	S1B	13D
R7	18A	R55	16C	S1C	8D
R8	18A	R56	17C	S2A	10F
R9	20A	R57	18C	S2B	13F
R10	21A	R58	18C	S2C	8F
R11	21A	R59	19C	S3	6G
R12	22A	R60	20C	S4A	10F
R13	23A	R61	21L	S4B	13F
R14	23A	R62	21C	S4C	16F
R15	24A	R63	15C	S4D	17F
R16	25A	R64	16C	S5	13H
R17	26A	R65	17C	S6	19G
R18	26A	R66	18C	S7	5H
R19	27A	R67	18C	S8A	3G
R20	15A	R68	19C	S9A	2A
R21	16A	R69	20C	S9B	2A
R22	17A	R70	21C	S9C	2B
R23	18A	R71	21C	S10A	2C
R24	18A	R72	15D	S10B	2C
R25	19A	R73	16D	S10C	2D
R26	20A	R74	17D	S11A	2E
R27	21A	R75	18D	S11B	2E
R28	21A	R76	18D	S12	22H
R29	22A	R77	19D	S13	18H
R30	23A	R78	20D		
R31	23A	R79	21D		

* See figure 5-28





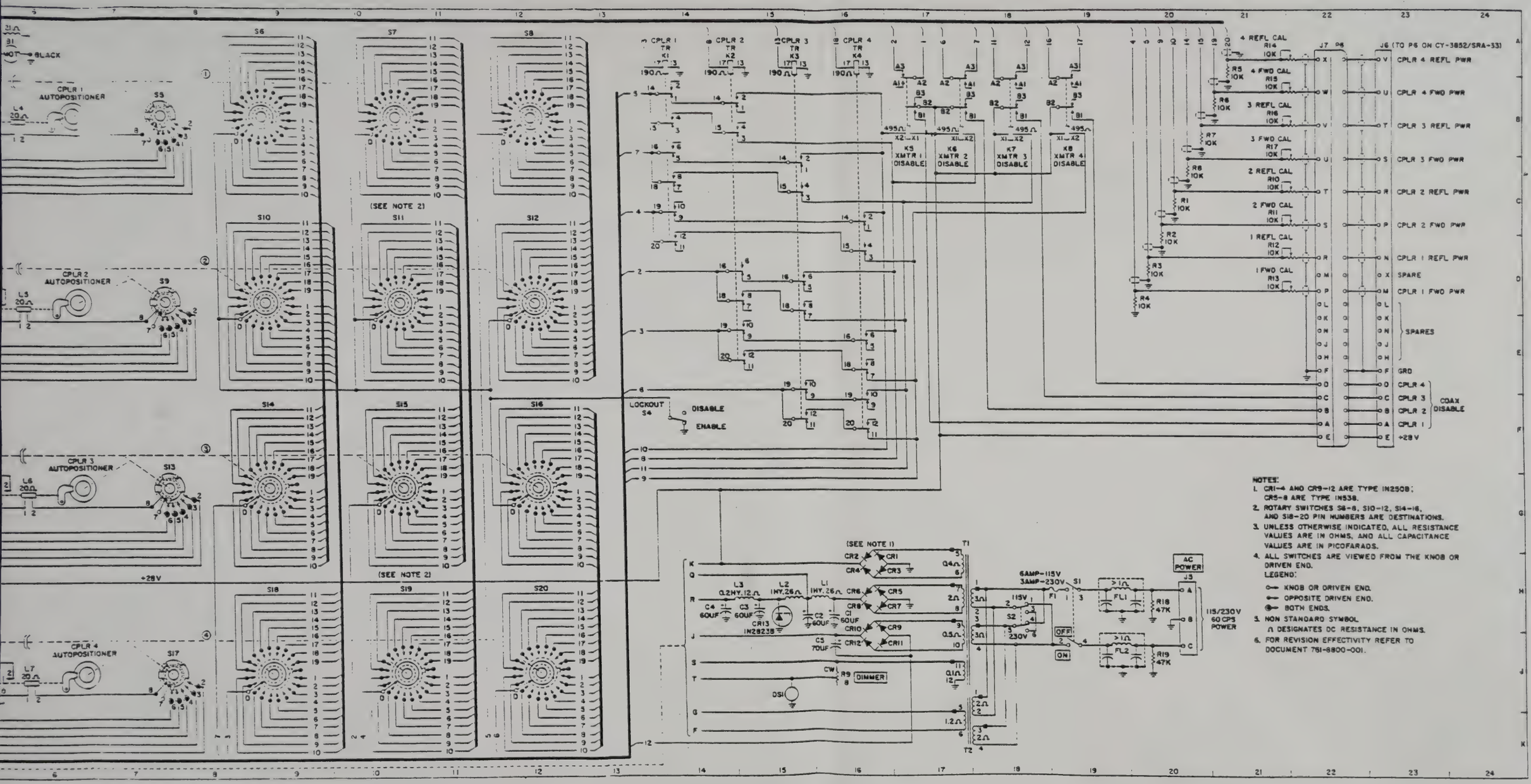
PART LOCATION INDEX

REF DESIG	LOC	REF DESIG	LOC	REF DESIG	LOC
C1	27C	E2	10E	R113	15E
C2	28F	E3	10F	R114	15E
C3	5D	E4	24I	R115	17F
C4	8I	E5	27I	R116	17E
C5	24H	E6	28E	R117	17E
C6	10F	E7	28F	R118	19F
C7	11G	G1	7E	R119	19E
C8	12G	J2	28B	R120	19E
C9	14E	J6	3B	R121	21E
C10	16E	K1	5H	R122	21E
C11	18E	K2	6J	R123	21E
C12	20E	L2	4C	R124	23F
C13	22E	L3	4C	R125	23E
C14	19H	MG1	20C	R126	23E
C15	25F	P7	3C	R127	27E
C16	16F	Q1	14F	R128	27F
C17	11G	Q2	16F	R129	14G
C18	15F	Q3	18F	R130	14G
C19	17F	Q4	20F	R131	15H
C20	19F	Q5	22F	R132	16G
C21	21F	Q6	24F	R133	17H
C22	23F	Q7	27E	R134	18G
C23	14H	Q8	27G	R135	18G
C24	16H	R101	5D	R136	19H
C25	18H	R102	6E	R137	20G
C26	20H	R103	5H	R138	21H
C27	22H	R104	8G	R139	22G
C28	24H	R105	11F	R140	22G
C29	16H	R106	12F	R141	23H
C30	10F	R107	12E	R142	24G
C31	26H	R108	10E	R143	25H
CR1	11H	R109	11F	R144	17H
CR2	12H	R110	13F	R145	19H
CR3	24E	R111	13E	R146	24H
DC1	4B	R112	15F	R147	26H
E1				T1	26E

Figure 5-28. Antenna Coupler CU-1131/SRA-33 Through CU-1134/SRA-33, Gear Plate Assembly, Schematic Diagram

NOTES:
1. UNLESS OTHERWISE INDICATED ALL RESISTANCE VALUES ARE IN OHMS, ALL CAPACITANCE VALUES IN PICOFARADS, AND ALL INDUCTANCE VALUES ARE IN MILLIHENRYS.
2. THE LETTERS (CW OR CCW) PLACED ADJACENT TO THE APPROPRIATE TERMINAL OF A POTENTIOMETER OR RHEOSTAT INDICATES THE DIRECTION OF ROTATION, WHEN VIEWED FROM
3. UNLESS OTHERWISE INDICATED, ALL VOLTAGES ARE DC TAKEN WITH A 20,000 OHM-PER-VOLT METER, AND MEASURED TO GROUND (CHASSIS)
4. NON STANDARD SYMBOL Ω DESIGNATES DC RESISTANCE VALUES IN OHMS.

TUNED CAVITY RESONATOR
INPUT
OUTPUT
RF INPUT FROM P6 ON FRONT PANEL ASSY
J6
DCI
FWD
RFL
L2 3UH .14Ω
L3 3UH .14Ω
P7
W
V
U
T
S
R
SPARE
GRD P
FWD PWR C
RFL PWR B
(+28V) BRIDGE F
6.3V AC E
FREQ BRIDGE SIGNAL X
(115V) MOT FIELD K L
AMPL FINAL (SWITCHED) M
SERVO RUN DISABLE D
+AMPL FINAL J
(+28V) AUTOPOSITIONER H
LOW FREQ LOCKOUT N
+SERVO AMPL A
TO J3 ON FRONT PANEL ASSY
FREQ MC INDICATOR
10.9:1
32.7:1
CCW
R101 20K
CW
C3 220UF
R102 2320
G1 CHOPPER
360Ω
YEL
RED
0 TO 28V DEPENDING ON FREQ SELECTED
GRD ON FREQ BELOW 225.00MC
K1 .03Ω
SERVO RUN DISABLE
R103 0.1
C4 70UF
R104 15
K2 495Ω
LOW FREQ LOCKOUT
960Ω
RATE GENERATOR
GEN
2600Ω
14 VAC AT NORMAL TUNING SPEEDS
SERVO AMPLIFIER
RATE
ERROR
GRD 1
R108 27K
R107 27K
C30 0.1UF
R109 100
C6 1UF
R105 10K
R106 10K
C17 0.1UF
C7 0.47UF
CR2 1N816W
CR1 1N816W
C8 1UF
SERVO GAIN R110 50K
+8.2V
R113 2700
C9 150UF
R112 5600
R111 33K
R114 33K
+10.2V
R116 2200
C10 150UF
C16 1000
R115 5600
R117 33K
+14V
R119 1800
C11 150UF
R118 5600
R120 33K
Q1 2N697
Q2 2N697
Q3 2N697
2V
5.2V
1.6V
2.1V
6.7V
1.7V
1.9V
10.5V
1.4V
C18 100UF
C19 100UF
C20 100UF
R129 10K
R130 33
C23 330UF
R131 2700
R132 10K
C24 330UF
R133 2700
R134 5600
R135 33
C25 330UF
R136 2700
C14 47UF
R145 4700
C29 47UF
R144 68K

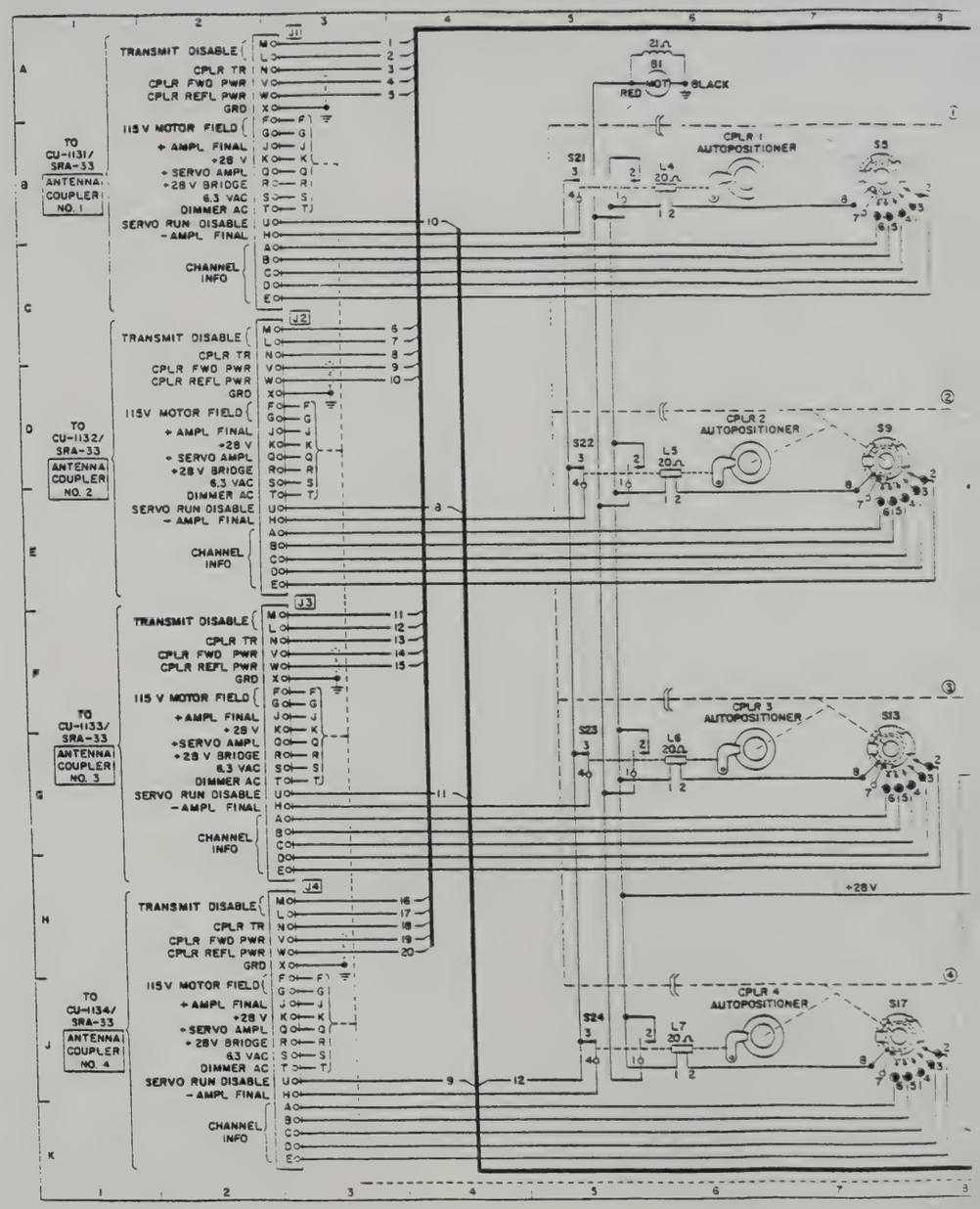


NOTES:
1. CR1-4 AND CR9-12 ARE TYPE IN2508; CR5-8 ARE TYPE IN538.
2. ROTARY SWITCHES S5-8, S10-12, S14-16, AND S18-20 PIN NUMBERS ARE DESTINATIONS.
3. UNLESS OTHERWISE INDICATED, ALL RESISTANCE VALUES ARE IN OHMS, AND ALL CAPACITANCE VALUES ARE IN PICOFARADS.
4. ALL SWITCHES ARE VIEWED FROM THE KNOB OR DRIVEN END.
   LEGEND:
   - KNOB OR DRIVEN END.
   - OPPOSITE DRIVEN END.
   - BOTH ENDS.
5. NON STANDARD SYMBOL
   Ω DESIGNATES DC RESISTANCE IN OHMS.
6. FOR REVISION EFFECTIVITY REFER TO DOCUMENT 751-8800-001.

Figure 5-29. Control-Power Supply C-4586/SRA-33, Schematic Diagram

PART LOCATION INDEX

REF DESIG	LOC	REF DESIG	LOC	REF DESIG	LOC
B1	6A	K2	15A	R16	21B
C1	16H	K3	15A	R17	21B
C2	16H	K4	16A	R18	20G
C3	15H	K5	17B	R19	20J
C4	14H	K6	17B	S1	19H
C5	15J	K7	18B	S2	18H
CR1	16H	K8	19B	S3	
CR2	16H	L1	16H	S4	14F
CR3	16H	L2	15H	S5	8B
CR4	16H	L3	15H	S6	9A
CR5	16H	L4	6B	S7	10A
CR6	16H	L5	6D	S8	12A
CR7	16H	L6	6F	S9	8D
CR8	16H	L7	6J	S10	9C
CR9	16J	P6	22A	S11	10C
CR10	16J	R1	20C	S12	12C
CR11	16J	R2	20D	S13	8F
CR12	16J	R3	20D	S14	9F
DS1	15J	R4	20D	S15	10F
F1	19H	R5	21B	S16	12F
FL1	19H	R6	21B	S17	8J
FL2	19J	R7	22B	S18	9H
J1	3A	R8	20C	S19	10H
J2	3C	R9		S20	12H
J3	3F	R10	21C	S21	5B
J4	3H	R11	21C	S22	5D
J5	20H	R12	21D	S23	5F
J6	23A	R13	21D	S24	5J
J7	22A	R14	21A	T1	17H
K1	14A	R15	21B	T2	17K



SRA-33
Info

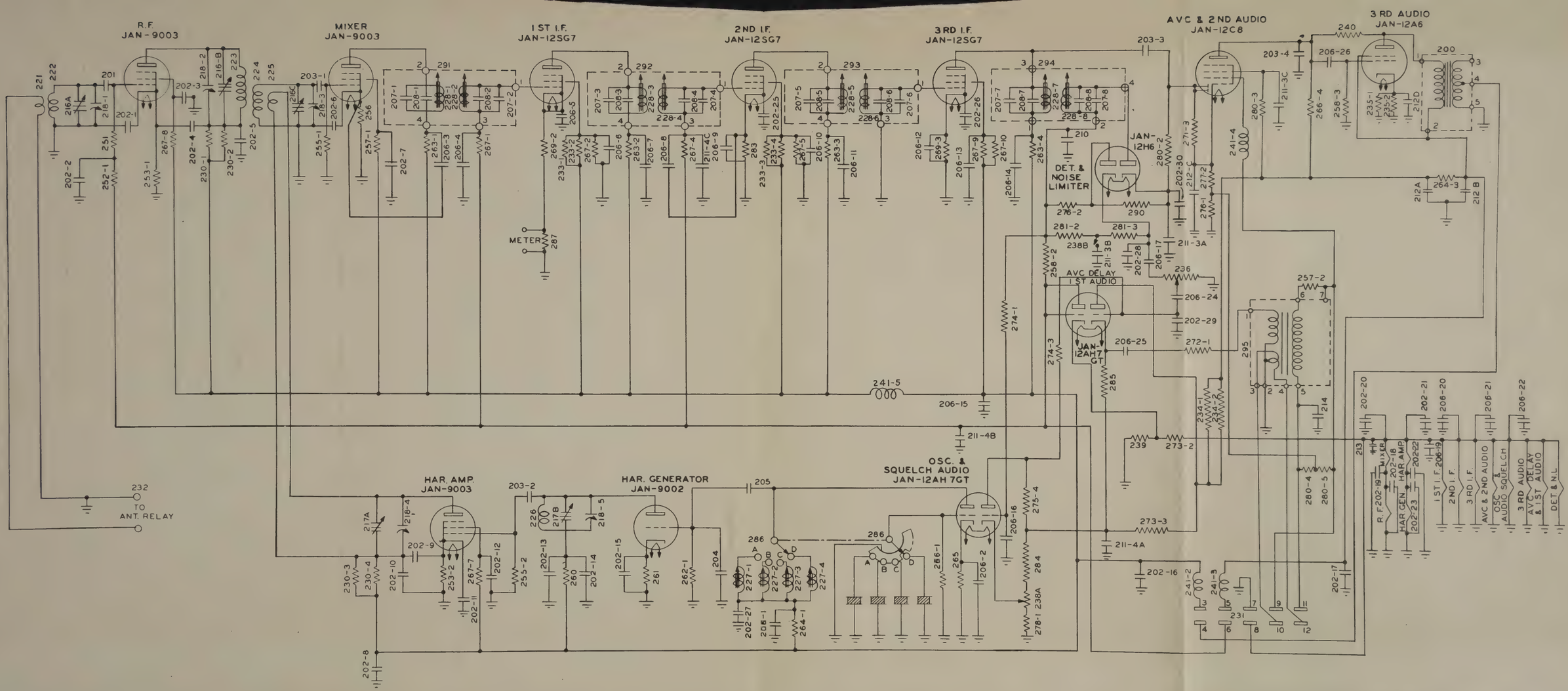


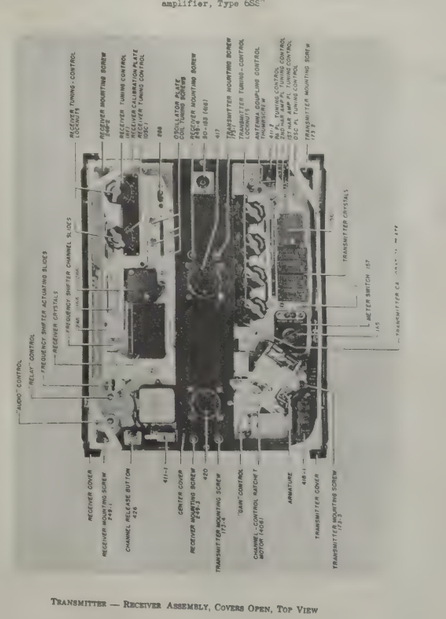
Figure 8-3—Radio Receiver BC-624-C—Schematic Diagram

TABLE OF REPLACEABLE PARTS

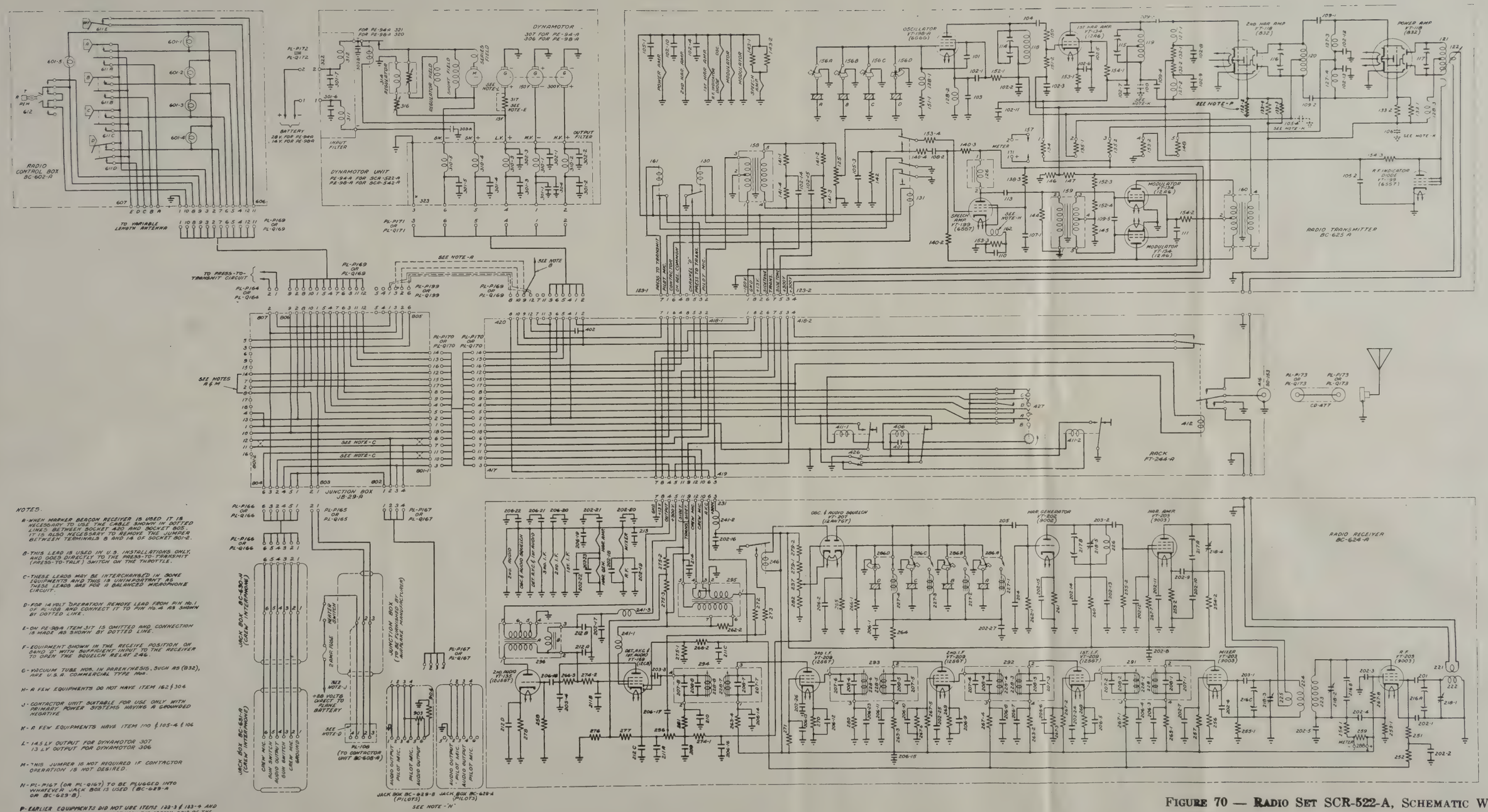
Circuit Ref. No.	Name	Description	Function
b. Radio Receiver BC-624-A			
201	Capacitor	10 mmf ±20%, 500v d.c.w., mica, Aero Type 1468, C. D. Type 5LS,1M-262 case	R-F grid coupling
202-1	Capacitor	.00068 mfd ±20%, 300v, d.c.w., mica, Aero Type 1468, C.D. Type 5LS,1M-262 case	R-F cathode bypass
202-2		Same as 202-1	R-F AVC filter
202-3		Same as 202-1	R-F screen bypass
202-4		Same as 202-1	R-F plate bypass to cathode
202-5		Same as 202-1	R-F plate bypass to ground
202-6		Same as 202-1	Mixer cathode bypass
202-7		Same as 202-1	Mixer screen bypass
202-8		Same as 202-1	Harm. amp. B+ filter
202-9		Same as 202-1	Harm. amp. plate bypass to cathode
202-10		Same as 202-1	Harm. amp. plate bypass to ground
202-11		Same as 202-1	Harm. amp. cathode bypass
202-12		Same as 202-1	Harm. amp. screen bypass
202-13		Same as 202-1	Harm. generator plate bypass
202-14		Same as 202-1	Harm. generator plate bypass
202-15		Same as 202-1	Harm. generator cathode bypass
202-16		Same as 202-1	R-F B+ filter
202-17		Same as 202-1	Audio B+ filter
202-18		Same as 202-1	R-F heater bypass
202-19		Same as 202-1	Mixer heater bypass
202-20		Same as 202-1	Mixer heater bypass
202-21		Same as 202-1	Harm. amp. heater bypass
202-22		Same as 202-1	Harm. amp. heater bypass
202-23		Same as 202-1	Harm. generator heater bypass
202-24		Same as 202-1	1st i-f suppressor bypass
202-25		Same as 202-1	2nd i-f suppressor bypass
202-26		Same as 202-1	3rd i-f suppressor bypass
202-27		Same as 202-1	Osc. plate coil bypass
203-1	Capacitor	47 mmf ±20%, 500v d.c.w., mica, Aero Type 1468, C. D. Type 5LS,1M-262 case	Mixer grid coupling
203-2		Same as 203-1	Harm. amp. grid coupling
203-3		Same as 203-1	AVC Diode coupling
203-4		Same as 203-1	1st audio plate r-f bypass
204	Capacitor	15 mmf ±20%, 500v d.c.w., mica, Aero Type 1468, C. D. Type 5LS,1M-262 case	Osc. plate resonator
205	Capacitor	220 mmf ±20%, 500v d.c.w., mica, Aero Type 1468, C.D. Type 5LS,1M-262 case	Harm. generator grid
206-1	Capacitor	.006 mfd ±20%, 300v d.c.w., mica, Aero Type 1467, C.D. Type 1WL, Mica Type W	Osc. plate bypass
206-2		Same as 206-1	Osc. cathode bypass
206-3		Same as 206-1	Mixer plate bypass
206-4		Same as 206-1	1st i-f AVC filter
206-5		Same as 206-1	1st i-f cathode bypass
206-6		Same as 206-1	1st i-f screen bypass
206-7		Same as 206-1	1st i-f plate bypass
206-8		Same as 206-1	2nd i-f AVC filter
206-9		Same as 206-1	2nd i-f cathode bypass
206-10		Same as 206-1	2nd i-f screen bypass
206-11		Same as 206-1	2nd i-f plate bypass
206-12		Same as 206-1	3rd i-f cathode bypass
206-13		Same as 206-1	3rd i-f screen bypass
206-14		Same as 206-1	3rd i-f plate bypass
206-15		Same as 206-1	B+ bypass
206-16		Same as 206-1	Audio squelch grid bypass
206-17		Same as 206-1	Audio coupling
206-18		Same as 206-1	2nd audio grid coupling
206-19		Same as 206-1	1st i-f heater bypass
206-20		Same as 206-1	2nd i-f heater bypass
206-21		Same as 206-1	3rd i-f heater bypass
206-22		Same as 206-1	Osc. and audio squelch heater bypass
206-23		Same as 206-1	3rd i-f grid bypass
207-1	Capacitor	60 mmf ±20%, 500v d.c.w., mica, Aero Type 1469, C. D. Type 5R, 1M-262 case, part of 291	Mixer plate resonator
207-2		Same as 207-1,part of 291	1st i-f grid resonator
207-3		Same as 207-1,part of 292	1st i-f plate resonator
207-4		Same as 207-1, part of 292	2nd i-f grid resonator
207-5		Same as 207-1,part of 293	2nd i-f plate resonator
207-6		Same as 207-1, part of 293	3rd i-f grid resonator
207-7		Same as 207-1, part of 294	3rd i-f plate resonator
207-8		Same as 207-1, part of 294	Diode resonator
208-1	Capacitor	15 mmf ±1%, 500v d.c.w., Type NC60K, ceramicon, part of 291	Mixer plate resonator
208-2		Same as 208-1, part of 291	1st i-f grid resonator
208-3		Same as 208-1, part of 292	1st i-f plate resonator
208-4		Same as 208-1, part of 292	2nd i-f grid resonator
208-5		Same as 208-1, part of 293	2nd i-f plate resonator
208-6		Same as 208-1, part of 293	3rd i-f grid resonator
208-7		Same as 208-1, part of 294	3rd i-f plate resonator
208-8		Same as 208-1, part of 294	Diode resonator
209	Capacitor	100 mmf ±20%, 500v d.c.w., mica, Aero Type 1468, C.D. Type 5LS,1M-262 case	Audio diode bypass
210	Capacitor	330 mmf ±20%, 500v d.c.w., mica, Aero Type 1468, C.D. Type 5LS,1M-262 case	Audio diode bypass
211A			1st audio cathode bypass
211B	Capacitor	3-section, per section .1 mfd +15%, -12%, 400v d.c.w., oil-paper, special	1st Audio screen bypass
211C			AVC filter
212A		10 mfd ±10%, 350v d.c.w., electrolytic	Audio B+ filter
212C		5 mfd ±10%, 150v d.c.w., electrolytic	Audio cathode bypass
212D		5 mfd ±10%, 150v d.c.w., electrolytic	2nd audio cathode bypass
213	Capacitor	1 mfd ±10%, 100v d.c.w., oil-paper	R-F and mixer heater bypass
214	Capacitor	82 mmf ±2%, 500v d.c.w., C.D. Type 5R, Aero Type 1469, mica, 1M-262 case	Bridge balancing
216A	Capacitor	Effective capacitance per section 36.0 mmf, min. capacitance 6 mmf, 3-section, variable	R-F grid tuning
216B		Rear section,eff. cap.36 mmf, cap. 6 mmf, variable	R-F plate tuning
216C		Front section, eff. cap. 39.6 mmf,min. cap. 6.5 mmf, variable	Harm. generator plate tuning
217A		Harm. generator cathode bypass	
217B	Capacitor	Effective capacitance 10 mmf, variable	R-F grid trimmer for 216A
218-1	Capacitor	Effective capacitance 10 mmf, variable	R-F plate trimmer for 216B
218-2	Capacitor	Effective capacitance 10 mmf, variable	Mixer grid trimmer for 216C
218-3	Capacitor	Effective,capacitance 10 mmf, variable	Harm. amp. plate trimmer for 217A
218-4	Capacitor	Effective capacitance 10 mmf, variable	Harm. generator plate trimmer for 217B
218-5	Capacitor	Effective capacitance 10 mmf, variable	Harm. generator plate resonator
219	Inductor	2 turns #26 enameled wire, permeability tuned	Harm. generator plate resonator
220	Inductor	23 turns #26 enameled wire, permeability tuned	Osc. plate resonator, channel A
221	Inductor	One turn #14 tinned copper wire	Antenna coupling
222	Inductor	Two turns #14 tinned copper wire	R-F grid resonator
223	Inductor	Two turns #14 tinned copper wire	R-F plate resonator
224	Inductor	Two turns #14 tinned copper wire	Mixer grid resonator
225	Inductor	One turn #12 tinned copper wire	Harm. amp. plate resonator
226	Inductor	Two turns #14 tinned copper wire	Harm. generator plate resonator
227	Inductor	23 turns #26 enameled wire, permeability tuned	Osc. plate resonator, channel B
227-2		Same as 227-1	Osc. plate resonator, channel C
227-3		Same as 227-1	Osc. plate resonator, channel D
227-4		Same as 227-1	Osc. plate resonator, channel E
228-1	Inductor	10 turns #22 enameled wire, permeability tuned, threaded form, part of 291	Mixer plate resonator
228-2		Same as 228-1, part of 291	1st i-f grid resonator
228-3		Same as 228-1, part of 292	1st i-f plate resonator
228-4		Same as 228-1, part of 292	2nd i-f grid resonator
228-5		Same as 228-1, part of 293	2nd i-f plate resonator
228-6		Same as 228-1, part of 293	3rd i-f grid resonator
228-7		Same as 228-1, part of 294	3rd i-f plate resonator
228-8		Same as 228-1, part of 294	Audio diode
231	Plug	10-contact, similar to Type 410-AB 1/16" less angle brackets	Receiver connector
232	Plug board assembly		Receiver input
236	Potentiometer	150,000 ohm, special, Type CS, Curve "C"	Audio volume control
237	Potentiometer	2000 ohm, special, Type CS, Curve "A"	Audio squelch RELAY sens. control
241-1	Reactor, r-f	38 turns,#28 enameled wire, wound on a 1 Meg. ½w resistor	1st audio grid choke
241-2		Same as 241-1	B+ r-f choke
241-3		Same as 241-1	B+ r-f choke
243-1	Socket, tube	Octal, bakelite base, Type S-8TM	For tubes VT-207, osc. audio squelch
243-2		Same as 243-1	For Tube VT-209, 1st i-f
243-3		Same as 243-1	For Tube VT-209, 2nd i-f
243-4		Same as 243-1	For Tube VT-209, 3rd i-f
243-5		Same as 243-1	For Tube VT-169, det., AVC, and 1st audio
243-6		Same as 243-1	For Tube VT-135, 2nd Audio
244-1	Socket, tube	7-contact, bakelite base, Type 7S-7PT	For Tube VT-203, r-f amp.
244-2		Same as 244-1	For Tube VT-203, mixer
244-3		Same as 244-1	For Tube VT-203, harm. amp.
244-4		Same as 244-1	For Tube VT-202, harm. gen.
246	Relay	SPST, 5000 ohm ±10%, 4 ma ±.5 ma, operates with current change of .2 ma, Sigma Type 4C1, Allied Type G	Squelch circuit
247	Screw	1 3/4" long, #8-32 x 3/8, red-enameled, special	Mounting
248	Feq. shifter	Channel slide and tuning control assembly	Channel selection
249-1		Same as 249-1	
249-2		Same as 249-1	
249-3		Same as 249-1	
249-4		Same as 249-1	
250	Spring	Phosphor-bronze,NP	For tube holder
251	Resistor	470,000 ohm ±5%, ½w, special, Type EB-4745	R-F stage grid leak
252	Resistor	100,000 ohm ±5%, ½w, special, Type EB-1045	R-F stage AVC filter
252-2	Resistor	Same as 252	
253-1	Resistor	330 ohm ±5%, ½w,special Type EB-3315	R-F stage cathode bias
253-2		Same as 253-1	Harm. amp. cathode bias
254-1	Resistor	6800 ohm ±5%, ½w, special, Type EB-6825	R-F stage plate filter
254-2		Same as 254-1	Harm. amp. plate filter
255-1	Resistor	1.8 meg ±5%, ½w,special, Type EB-1859	Mixer grid leak
255-2		Same as 255-1	Harm. amp. grid leak
256	Resistor	1000 ohm ±5%,½w,special Type EB-1025	Mixer cathode bias
257	Resistor	330,000 ohm ±5%,½w,special, Type EB-3345	Mixer screen dropping
258	Resistor	680,000 ohm ±5%, 1w, ceramic, Speer Type SI-1, Allen-B Type GB-6845	2nd audio grid leak
259	Resistor	10 ohm ±5%,½w, special, Type EB-1009	Test meter shunt
260	Resistor	27,000 ohm ±5%,½w,special, Type EB-2735	Harm. generator plate filter
261	Resistor	1200 ohm ±5%, ½w, special, Type EB-1225	Harm. generator cathode bias
262-1	Resistor	560,000 ohm ±5%,½w, special, Type EB-5645	Harm. generator grid leak
262-2		Same as 262-1	1st audio compensating
263-1	Resistor	4700 ohm ±5%, 1w, ceramic, speer Type SI-1,Allen-B Type EB-4725	Mixer plate filter
263-2		Same as 263-1	1st i-f plate filter
263-3		Same as 263-1	2nd i-f plate filter
263-4		Same as 263-1	3rd i-f plate filter
264	Resistor	10,000 ohm ±5%, 1w,ceramic, Speer Type SI-1,Allen-B Type GB-1035	Osc. plate filter
265	Resistor	2700 ohm ±5%, 1w, ceramic, Speer Type SI-1,Allen-B Type GB-2725	Osc. cathode bias
266-1	Resistor	270,000 ohm ±5%, 1w, ceramic, Speer Type SI-1, Allen-B Type GB-2745	Osc. grid leak
266-2		Same as 266-1	AVC filter
266-3		Same as 266-1	1st audio plate load
267-1	Resistor	100,000 ohm ±5%, 1w, ceramic, Speer Type SI-1, Allen-B Type GB-1045	1st i-f AVC filter
267-2		Same as 267-1	1st i-f screen voltage divider
267-3		Same as 267-1	1st i-f screen voltage divider
267-4		Same as 267-1	2nd i-f AVC filter
267-5		Same as 267-1	2nd i-f screen voltage divider
267-6		Same as 267-1	2nd i-f screen voltage divider
267-7		Same as 267-1	Harm. amp. screen dropping
267-8		Same as 267-1	R-F screen dropping
268	Resistor	390 ohm ±5%, 1w, ceramic, Speer Type SI-1, Allen-B Type GB-3915	1st i-f cathode bias
269	Resistor	270 ohm ±5%, 1w, ceramic, special	2nd i-f cathode bias
270	Resistor	470 ohm ±5%, 1w, ceramic, special	3rd i-f cathode bias
271	Resistor	82,000 ohm ±5%, 1w, ceramic,special	3rd i-f screen dropping
272	Resistor	120,000 ohm ±5%, ½w, ceramic, special	Audio squelch compensating
273	Resistor	5600 ohm ±5%, 1w, ceramic, Speer Type SI-1, Allen-B Type GB-5625	Audio Squelch compensating
274-1	Resistor	2.2 megohms ±5%, 1w, ceramic, Speer Type SI-1, Allen-B Type GB-2255	Audio squelch coupling
274-2		Same as 274-1	1st audio screen dropping
275-1	Resistor	470,000 ohm ±5%, 1w,ceramic, Speer Type SI-1,Allen-B Type GB 4745	AVC diode load
275-2		Same as 275-1	1st audio grid
275-3		Same as 275-1	1st audio grid
276	Resistor	18,000 ohm ±5%, 1w, ceramic, Speer Type SI-1, Allen-B Type GB-1835	AVC delay
277	Resistor	1800 ohm ±5%, 1w,ceramic Speer Type SI-1, Allen-B Type GB-1825	1st audio cathode bias
278	Resistor	1500 ohm ±5%, 1w, ceramic, Speer Type SI-1,Allen-B Type GB-1525	2nd audio cathode bias
279-1	Resistor	47,000 ohm ±5%,1w,ceramic, Speer Type SI-1, Allen-B Type GB-4735	Squelch cath. bleeder
279-2		Same as 279-1	Squelch cath. bleeder
279-3		Same as 279-1	Audio diode filter
280	Resistor	1 meg. ±5%,1w,ceramic, Speer Type SI-1,Allen-B Type GB-1055	3rd i-f grid leak
281	Resistor	150,000 ohm ±5%, 1w,ceramic, Speer Type SI-1, Allen-B Type GB-1545	Audio diode filter
282	Resistor	3300 ohm ±5%, 1w, ceramic, Speer Type SI-1,Allen-B Type GB-3325	Audio Squelch cathode bias
286A			Channel A crystal and plate coil selector
286B			Channel B crystal and plate coil selector
286C			
286D	Switch	Bakelite wafer	Channel C crystal and plate coil selector
288	Socket	2-contact, plug-board assembly	Channel D crystal and plate coil selector
289	Socket	12-contact plug-board assembly	Rec. test-milliammeter socket
			Crystal sockets

TABLE OF REPLACEABLE PARTS

Circuit Ref. No.	Name	Description	Function
a. Radio Transmitter BC-625-A			
100	Capacitor	15 mmf ±1mmf,500v.d.c.w. ceramicon, Type NPOL	Balancing, 1st harm. amp.plate
101	Capacitor	10mmf ±0.5 mmf,500v d.c.w. ceramicon, Type NPOL	Osc. feedback
102-1	Capacitor	.006 mfd ±20%, 300v d.c.w., mica, Aero Type 1467, C.D. Type 1WL, Mica Type W	Osc. screen coupling
102-2		Same as 102-1	Osc. plate bypass
102-3		Same as 102-1	1st harm. amp. grid bypass
102-4		Same as 102-1	1st harm.amp.filament bypass
102-5		Same as 102-1	1st harm.amp. screen bypass
102-6		Same as 102-1	1st harm. amp. cathode bypass
102-7		Same as 102-1	1st harm.amp. plate bypass
102-8		Same as 102-1	2nd harm.amp. grid bypass
102-9		Same as 102-1	2nd harm.amp. grid bypass
102-10		Same as 102-1	2nd harm.amp. filament bypass
102-11		Same as 102-1	Meter shunt bypass
102-12		Same as 102-1	Power-amp. grid bypass
102-13		Same as 102-1	Power-amp. grid bypass
102-14		Same as 102-1	Bridge blocking
102-15		Same as 102-1	Bridge blocking
103	Capacitor	50 mmf ±1%,500v d.c.w., silver Mica, Type MIJ	Osc. cathode bypass
104	Capacitor	100 mmf ±5 mmf, 500v d.c.w., ceramicon, Type NPOD	1st harm. amp. grid coupling
105-1	Capacitor	.001 mfd ±10%, 500v d.c.w., mica, C.D.Type 5WL, Aero Type 1468	Power amp. filament bypass
105-2		Same as 105-1	R-F indicator bypass
105-3		Same as 105-1	Speech-amp. grid bypass
105-4		Same as 105-1	Meter shunt bypass
106	Capacitor	.002 mfd ±5%, 800v d.c.w., mica, Type 1WF18	Power-amp. bypass
107-1	Capacitor	0.1 mfd ±10%, 400v d.c.w., paper, Mica Type 345-21, Solar Type MPM-4147	Speech-amp. screen bypass
108-2	Capacitor	.001 mfd ±5%, 500v d.c.w., mica, C.D. Type 1WL, Aero Type 1467. Mica Type W	Tone feedback
109-1	Capacitor	20 mmfd mmf, 500v d.c.w., ceramicon Type NPOL	Power-amp. grid coupling
109-2		Same as 109-1	Power-amp. grid coupling
109-3		Same as 109-1	2nd Harm. amp. grid coupling
109-4		Same as 109-1	2nd harm.amp. grid coupling
109-5		Same as 109-1	H-F bypass
110	Capacitor	1.0 mfd±15%, 100v d.c.w., oil-paper	Speech-amp. cathode bypass
111	Capacitor	0.5 mfd + 10% -3%, 400v d.c.w., oil-paper	Mod. screen bypass
113	Capacitor	0.0003 mfd ±5%, 500v d.c.w., mica, C.D. Type 5 WL, Aero Type 1468 Erie Type M15GM	Speech-amp. plate blocking
114	Capacitor	Stators in parallel, 11.0 ±1 mmf min, 65.5 ±1.5 mmf eff.	Osc. plate tuning
115	Capacitor	Stators in series, 3.5 ±1 mmf min, 27.0 ±1 mmf.eff.	1st harm. amp. pl. tuning
116	Capacitor	Stators in series, 3.0 ±1 mmf min., 16.5 ±1 mmf eff.	2nd harm. amp. pl. tuning
117	Capacitor	Stators in series, 2.8 ±1 mmf min., 11.0 ±1 mmf eff.	Power amp. plate tuning
118	Inductor	9½ turns #24 enameled copper wire, grooved form	Osc. plate tuning
119	Inductor	15 turns #10 silver-plated SD copper wire, tapped at 7 turns, self-supporting	1st harm. amp. pl tuning
120	Inductor	#10 bare wire, distributed inductance line	2nd harm. amp.pl tuning
121	Inductor	2 turns -gap- 2 turns, self-supporting, #10 SD silver-plated copper wire	Power amp. plate tuning
122	Inductor	3 turns, self-supporting #10 SD silver - plated copper wire, supplied with clamping	Ant. coupling
123-1	Plug	8-contact male, Type P-408	Trans. control circuit
123-2		Same as 123-1	Power input from rack
125	Potentiometer	1 meg. ±20%, Curve C, Type C	Audio GAIN control
126	Reactor, a-f	43H, .001 amp.d.c., 5000 ohm, Type EX-5B	Speech-amp.plate
127-1	Reactor, r-f	1 amp., 2½ meter, Type 20	2nd harm. amp. grid choke
127-2		Same as 127-1	2nd harm. amp. grid choke
127-3		Same as 127-1	Power-amp. grid choke
127-4		Same as 127-1	Power-amp. grid choke
128-1	Reactor,r-f	2.5 mh, 125 ma, 50 ohm, 1 amf, Type R-100	Osc. grid choke
128-2		Same as 128-1	Osc. cathode choke
128-3		Same as 128-1	Power amp. plate choke
130	Relay	0.2 sec. release, 12v,200-ohm coil, SPDT, type EA-6487	Slow release relay
131	Relay	200-ohm coil, 12v DPDT & SPST, normally unenergized, Type B-6106	Contactor relay
132-1	Resistor	25,000 ohm ±5%, 1w, ceramic, Speer Type SI-1, Allen-B Type GB-2535	2nd Harm. Amp. grid bias
132-2		Same as 132-1	2nd harm. amp. grid bias
133-1	Resistor	40,000 ohm ±½ 1w, ceramic	Power-amp. screen dropping
133-2		Same as 133-1	Power-amp. screen dropping
133-3		Same as 133-1	Voltage divider
133-4		Same as 133-1	Voltage divider
134	Resistor	1.53 ohm ±1% wire wound 1w, 3 watt	1st harm. amp. plate meter shunt
135-1	Resistor	0.76 ohm ±1%, wire wound, Type 181	2nd harm. amp. plate meter shunt
135-2		Same as 135-1	Power-amp. plate meter shunt
138-3	Resistor	1 meg. ±5%, 1w, ceramic, Speer Type SI-1, Allen-B Type GB-1055	Speech-amp. screen dropping
140-2	Resistor	500,000 ohm ±5%, 1w, ceramic, Speer Type SI-1, Allen-B Type GB-5045	Tone voltage divider
140-3		Same as 140-2	Tone voltage divider
140-4		Same as 140-2	Tone feedback coupling
141-1	Resistor	1 meg. ±5% ½w, ceramic, Speer Type SI-½, Allen-B Type EB-1059	Input bridge
141-2		Same as 141-1	Input bridge
141-3		Same as 141-1	Input bridge
141-4		Same as 141-1	Input bridge
142	Resistor	5000 ohm ±5%, 1w, ceramic, Speer Type SI-1, Allen-B Type GB-5025	Speech-amp. grid bias
143-1	Resistor	82 ohm ±5%, 1w, ceramic	Speech-amp. filament dropping
143-2		Same as 143-1	Speech-amp. filament dropping
144	Resistor	250,000 ohm ±5%, ½w,ceramic, Speer Type SI-½, Allen-B Type EB-2545	Speech-amp. plate load
145	Resistor	15,000 ohm ±5%, 1w, ceramic	Mod. bias bleeder
146	Resistor	6000 ohm ±5%, 1w, ceramic	Transformer bias bleeder
147	Resistor	18,000 ohm ±5%, 1w ceramic	Transformer bias divider
148	Resistor	75 ohm ±5%, 1w, ceramic	Power-amp.grid shunt
150	Resistor	50 ohm ±5%, 1w,ceramic, Speer Type SI-1, Allen-B Type GB-5005	1st harm.amp. grid coupling
151-1	Resistor	50,000 ohm ±5%, 1w, ceramic, Speer Type SI-1, Allen-B Type GB-5035	Osc. grid bias
151-2		Same as 151-1	1st harm.amp. grid bias
152-1	Resistor	50,000 ohm ±5%, 1w ceramic	Osc. screen dropping
152-2		Same as 152-1	2nd harm. amp. screen dropping
152-3		Same as 152-1	Mod. bias divider
152-4		Same as 152-1	Mod. bias divider
153-1	Resistor	2000 ohm ±5%, 1w,ceramic	1st harm. amp. cathode bias
153-2		Same as 153-1	R-F indicator plate shunt
153-3		Same as 153-1	Speech-amp. cathode bias
153-4		Same as 153-1	Speech-amp. grid suppressor
154-1	Resistor	5000 ohm ±5%,1w,ceramic	1st harm. amp. screen dropping
154-2		Same as 154-1	Mod. screen dropping
154-3		Same as 154-1	R-F indicator load
156A			Crystal selector, channel A
156B	Switch	4-section,2 position, 1-pole	Crystal selector, channel B
156C			Crystal selector, channel C
156D			Crystal selector, channel D
157	Switch	2-deck, 6 position, 1-pole Type 10206-B2	Meter Switch
158	Transformer	Res. pri., 5.2 ohm, center tap; sec., 4000 ohm; turns ratio 1:45.7; pri.imp. 200 ohm; sec. imp. 420,000 ohm	Microphone
159	Transformer	Res. pri. 1050 ohm,sec., 2750 ohm, center tap; turns ratio, 1:2; pri. imp. 125,000 ohm, sec. 500,000 ohm	Interstage
160	Transformer	Res. pri. 690 ohm,center tap; sec. 170 ohm; turns ratio 2:1; pri. imp. 22,000 ohm, sec. 5500 ohm	Modulation
161	Relay	200 ohm coil, SPST normally closed, Type G, catalogue #1n486	Press-to-transmit control
162	Reactor, r-f	38 turns #28 enamelled wire	Speech-amp. cathode r-f choke
163	Tube clamp assembly	Mycalex Strip with spring clamp	For 2nd harm. amp.
164-1	Strip	Mycalex 1/8"x3"x23/8"	Part of 163
164-2		Same as 164-1	Power-amp. clamp
165	Knob	Bar knob, Type J-10829	Meter switch
166	Freq. shifter assembly	Frequency shifter channel slides and tuning controls	Channel selection
167	Shield	Shield, Dzus fasteners	Power-amp. shield
168	Socket	2-contact	Transmitter output
169-1	Socket tube	Octal, Type S-8TM	For Tube VT-198-A, oscillator
169-2		Same as 169-1	For tube VT-134, 1st harmonic amp.
169-3		Same as 169-1	For Tube VT-134, modulator
169-4		Same as 169-1	For Tube VT-134, modulator
169-5		Same as 169-1	For Tube VT-199, sp. amp.
169-6		Same as 169-1	For Tube VT-199, r-f ind.
170-1	Socket,tube	7-contact, steatite,supplied with 2 clip and lead assemblies	For Tube VT-118, 2nd harm.amp.
170-2		Same as 170-1	For Tube VT-118, power amp.
171	Socket	2-contact	D-C meter socket
172	Plug board	Crystal board assembly including 128-1 and 151-1	For crystals
VT-118	Tube VT-118	Push-pull r-f beam power amp., Type 832	2nd harm. amp.
VT-118	Tube VT-118	Push-pull r-f beam power amp., Type 832	Power amplifier
VT-134	Tube VT-134	Beam power amplifier, Type 12A6	1st harm. amp.
VT-134	Tube VT-134	Beam power amplifier, Type 12A6	Modulator
VT-134	Tube VT-134	Beam power amplifier, Type 12A6	Modulator
VT-198-A	Tube VT-198-A	Power amplifier pentode, Type 6L6G	Oscillator
VT-199	Tube VT-199	Triple-grid, super-control amplifier, Type 6SK7	Speech amplifier
VT-199	Tube VT-199	Triple-grid super-control amplifier, Type 6SK7	R-F indicator diode



TRANSMITTER — RECEIVER ASSEMBLY, COVERS OPEN, TOP VIEW


RADIO CONTROL BOX BC-602-A
DYNAMOTOR UNIT PE-94-A FOR SCR-522-A PE-98-A FOR SCR-542-A
DYNAMOTOR 307 FOR PE-94-A 306 FOR PE-98-A
BATTERY 28 V. FOR PE-94A 14 V. FOR PE-98A
TO VARIABLE LENGTH ANTENNA
TO PRESS-TO-TRANSMIT CIRCUIT
JUNCTION BOX JB-29-A
RADIO TRANSMITTER BC-625-A
RADIO RECEIVER BC-624-A
ROCK FT-244-A
JACK BOX BC-630-H (CREW INTERPHONE)
JACK BOX BC-631-H (CREW INTERPHONE)
JUNCTION BOX (TO BE FURNISHED BY AIRPLANE MANUFACTURER)
JACK BOX BC-629-B (PILOTS)
JACK BOX BC-628-A (PILOTS)
TO CONTACTOR UNIT BC-608-H
+28 VOLTS DIRECT TO PLANE BATTERY
CD-477

NOTES:

A-WHEN MARKER BEACON RECEIVER IS USED, IT IS NECESSARY TO USE THE CABLE SHOWN IN DOTTED LINES BETWEEN SOCKET 420 AND SOCKET 805. IT IS ALSO NECESSARY TO REMOVE THE JUMPER BETWEEN TERMINALS 8 AND 14 OF SOCKET 801-E.

B-THIS LEAD IS USED IN U.S. INSTALLATIONS ONLY, AND GOES DIRECTLY TO THE PRESS-TO-TRANSMIT (PRESS-TO-TALK) SWITCH ON THE THROTTLE.

C-THESE LEADS MAY BE INTERCHANGED IN SOME EQUIPMENTS AND THIS IS UNIMPORTANT AS THESE LEADS ARE FOR A BALANCED MICROPHONE CIRCUIT.

D-FOR 14 VOLT OPERATION, REMOVE LEAD FROM PIN NO. 1 OF PL-108 AND CONNECT IT TO PIN NO. 4 AS SHOWN BY DOTTED LINE.

E-ON PE-98-A ITEM 317 IS OMITTED AND CONNECTION IS MADE AS SHOWN BY DOTTED LINE.

F-EQUIPMENT SHOWN IN THE RECEIVE POSITION, ON BAND 1, WITH SUFFICIENT INPUT TO THE RECEIVER TO OPEN THE SQUELCH RELAY 246.

G-VACUUM TUBE NOS. IN PARENTHESIS, SUCH AS (832), ARE U.S.A. COMMERCIAL TYPE NOS.

H-A FEW EQUIPMENTS DO NOT HAVE ITEM 162 & 304.

J-CONTACTOR UNIT SUITABLE FOR USE ONLY WITH PRIMARY POWER SYSTEMS HAVING A GROUNDED NEGATIVE.

K-A FEW EQUIPMENTS HAVE ITEM 110 & 105-A & 106.

L-14.5 V. OUTPUT FOR DYNAMOTOR 307. 13 V. OUTPUT FOR DYNAMOTOR 306.

M-THIS JUMPER IS NOT REQUIRED IF CONTACTOR OPERATION IS NOT DESIRED.

N-PL-P167 (OR PL-Q167) TO BE PLUGGED INTO WHATEVER JACK BOX IS USED (BC-629-A OR BC-629-B).

P-EARLIER EQUIPMENTS DID NOT USE ITEMS 133-3 & 133-4 AND ITEM 132-3 WAS CONNECTED BETWEEN THE SCREEN GRID OF THE 2nd HAR. AMP. AND TERMINAL 5 OF ITEM 140.

FIGURE 70 — RADIO SET SCR-522-A, SCHEMATIC WIRING DIAGRAM

		Same as 267-1									
268	Resistor	390 ohm ±5%, 1w, ceramic, Speer Type SI-1, Allen-B Type GB-3915	R-F screen dropping								
269	Resistor	270 ohm ±5%, 1w, ceramic, special	1st i-f cathode bias	101	Capacitor	15 mmf ±1mmf,500v.d.c.w. ceramicon, Type NPOL	Balancing, 1st harm. amp.plate	134	Resistor	Same as 135-1	
270	Resistor	470 ohm ±5%, 1w, ceramic, special	2nd i-f cathode bias	102-1	Capacitor	10mmf ±0.5 mmf.500v d.c.w. ceramicon, Type NPOK	Osc. feedback	135-1	Resistor	1.53 ohm ±1% Type 181, 5	
271	Resistor	82,000 ohm ±5%, 1w, ceramic,special	3rd i-f cathode bias	102-2	Capacitor	006 mfd ±20%, 300v d.c.w., mica, Aero Type 1467, C.D. Type 1WL, Mica Type W		135-2	Resistor	0.76 ohm ±1% Type 181	
272	Resistor	120,000 ohm ±5%, ½w, ceramic, special	3rd i-f screen dropping	102-3		Same as 102-1	Osc. screen coupling	138-3		Same as 135-1	
273	Resistor	5600 ohm ±5%, 1w, ceramic, Speer Type SI-1, Allen-B Type GB-5625	Audio squelch compensating	102-4		Same as 102-1	Osc. plate bypass		Resistor	1 meg. ±5%, Speer Type Type GB-105	
274-1	Resistor	2.2 megohms ±5%, 1w, ceramic, Speer Type SI-1, Allen-B Type GB-2255	Audio Squelch compensating	102-5		Same as 102-1	1st harm. amp. grid bypass	140-2	Resistor	500,000 ohm ramic, Spee Allen-B Typ	
274-2		Same as 274-1	Audio squelch coupling	102-6		Same as 102-1	1st harm.amp.fila-ment bypass	140-3		Same as 140-2	
275-1	Resistor	470,000 ohm ±5%, 1w,ceramic, Speer Type SI-1, Allen-B Type GB 4745	1st audio screen dropping	102-7		Same as 102-1	1st harm.amp. screen bypass	140-4		Same as 140-2	
275-2		Same as 275-1	AVC diode load	102-8		Same as 102-1	1st harm. amp. cathode bypass	141-1	Resistor	1 meg. ±5% Speer Type Type EB-105	
275-3		Same as 275-1	1st audio grid	102-9		Same as 102-1	1st harm.amp. plate bypass			Same as 141-1	
276	Resistor	18,000 ohm ±5%, 1w, ceramic, Speer Type SI-1, Allen-B Type GB-1835	1st audio grid	102-10		Same as 102-1	2nd harm.amp. grid bypass	141-2		Same as 141-1	
277	Resistor	1800 ohm ±5%, 1w,ceramic Speer Type SI-1, Allen-B Type GB-1825	AVC delay	102-11		Same as 102-1	2nd harm.amp. grid bypass	141-3		Same as 141-1	
278	Resistor	1500 ohm ±5%, 1w, ceramis, Speer Type SI-1,Allen-B Type GB-1525	1st audio cathode bias	102-12		Same as 102-1	2nd harm.amp. grid bypass	141-4		Same as 141-1	
279-1	Resistor	47,000 ohm ±5%,1w,ceramic, Speer Type SI-1, Allen-B Type GB-4735	2nd audio cathode bias	102-13		Same as 102-1	2nd harm.amp. filament bypass	142	Resistor	5000 ohm ±5% ic, Speer T Type GB-502	
279-2		Same as 279-1	Squelch cath. bleeder	102-14		Same as 102-1	Meter shunt bypass	143-1	Resistor	82 ohm ±5%,	
279-3		Same as 279-1	Squelch cath. bleeder	102-15		Same as 102-1	Power-amp. grid bypass	143-2		Same as 143-1	
280	Resistor	1 meg. ±5%,1w,ceramic, Speer Type SI-1,Allen-B Type GB-1055	Audio diode filter	103	Capacitor	50 mmf ±1%,500v d.c.w., silver mica, Type MIJ	Power-amp. grid bypass	144	Resistor	250,000 ohm ± ramic, Spee Allen-B Typ	
281	Resistor	150,000 ohm ±5%, 1w,ceramic, Speer Type SI-1, Allen-B Type GB-1545	3rd i-f grid leak	104	Capacitor	100 mmf ±5 mmf, 500v d.c.w., ceramicon, Type NPOD	Bridge blocking		Resistor	15,000 ohm ± ceramic	
282	Resistor	3300 ohm ±5%, 1w, ceramic, Speer Type SI-1,Allen-B Type GB-3325	Audio diode filter	105-1	Capacitor	.001 mfd ±10%, 500v d.c.w., mica, C.D.Type 5WL, Aero Type 1468	Bridge blocking		Resistor	6000 ohm ±5%	
286A			Audio Squelch cathode bias	105-2		Same as 105-1	Osc. cathode bypass	145	Resistor	18,000 ohm ± ceramic	
286B			Channel A crystal and plate coil slector	105-3		Same as 105-1	1st harm. amp. grid coupling	146	Resistor	75 ohm ±5%,	
286C			Channel B crystal and plate coil selector	105-4		Same as 105-1	Power amp. filament bypass	147	Resistor	50 ohm ±5%, Speer Type Allen-B Typ	
286C			Channel C crystal and plate coil selector	106	Capacitor	.002 mfd ±5%, 800v d.c.w., mica, Type 1WPLS	R-F indicator bypass	148	Resistor	50,000 ohm ± ramic, Spee Allen-B Typ	
286D	Switch	Bakelite wafer	Channel D crystal and plate coil selector	107-1	Capacitor	0.1 mfd ±10%, 400v d.c.w., paper, Mica Type 345-21, Solar Type MPW-4147	Speech-amp. grid bypass	150	Resistor	Same as 151-1	
288	Socket	2-contact, plug-board assembly	Rec. test-milliam-meter socket	108-2	Capacitor	.001 mfd ±5%, 500v d.c.w., mica, C.D. Type 1WL, Aero Type 1467. Mica Type W	Meter shunt bypass	151-1	Resistor	50,000 ohm ± ceramic	
289	Socket	12-contact plug-board assembly	Crystal sockets	109-1	Capacitor	20 mmf±1 mmf, 500v d.c.w., ceramicon Type NPOL	Power-amp. bypass	151-2		Same as 152-1	
				109-2		Same as 109-1	Speech-amp. screen bypass	152-1		Same as 152-1	
				109-3		Same as 109-1	Tone feedback	152-2		Same as 152-1	
				109-4		Same as 109-1	Power-amp. grid coupling	152-3		Same as 152-1	
				109-5		Same as 109-1		152-4		Same as 152-1	
				110	Capacitor	1.0 mfd±15%, 100v d.c.w., oil-paper	Power-amp. grid coupling	153-1	Resistor	2000 ohm ±5%	
				111	Capacitor	0.5 mfd + 10% -3%, 400v d.c.w., oil-paper	2nd Harm. amp. grid coupling	153-2		Same as 153-1	
							2nd harm.amp. grid coupling	153-3		Same as 153-1	
							H-F bypass	153-4		Same as 153-1	
							Speech-amp. cathode bypass	154-1	Resistor	5000 ohm ±5%	
							Mod. screen bypass	154-2		Same as 154-1	
								154-3		Same as 154-1	

Figure 8-3—Radio Receiver BC-624-C—Schematic Diagram

FIG. 14 — RADIO RECEIVER AND TRANSMITTER

TRANSMITTER BC-669-C, SCHEMATIC DIAGRAM. SCR/543

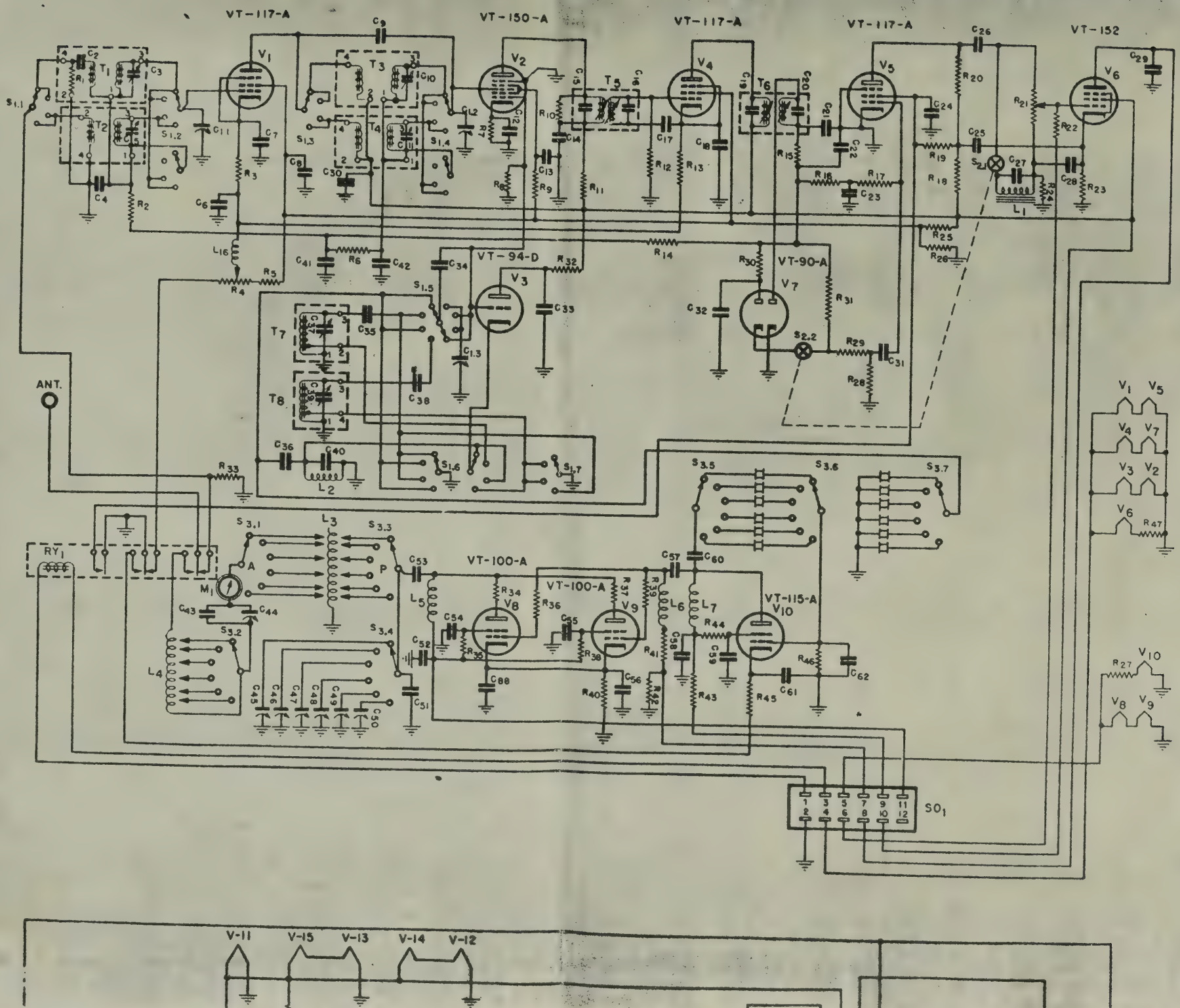


FIG. 14 — RADIO RECEIVER AND TRANSMITTER

SCR 543

PLUG
53+54 = GROUND
46 = VOL
45 = FIL.
56 = } + H.V.
57 = }
55 = AUDIO
-HV + ONE SIDE OF FIL. CONNECTED TO GROUND 53+54

RADIO RECEIVER BC-AS-229

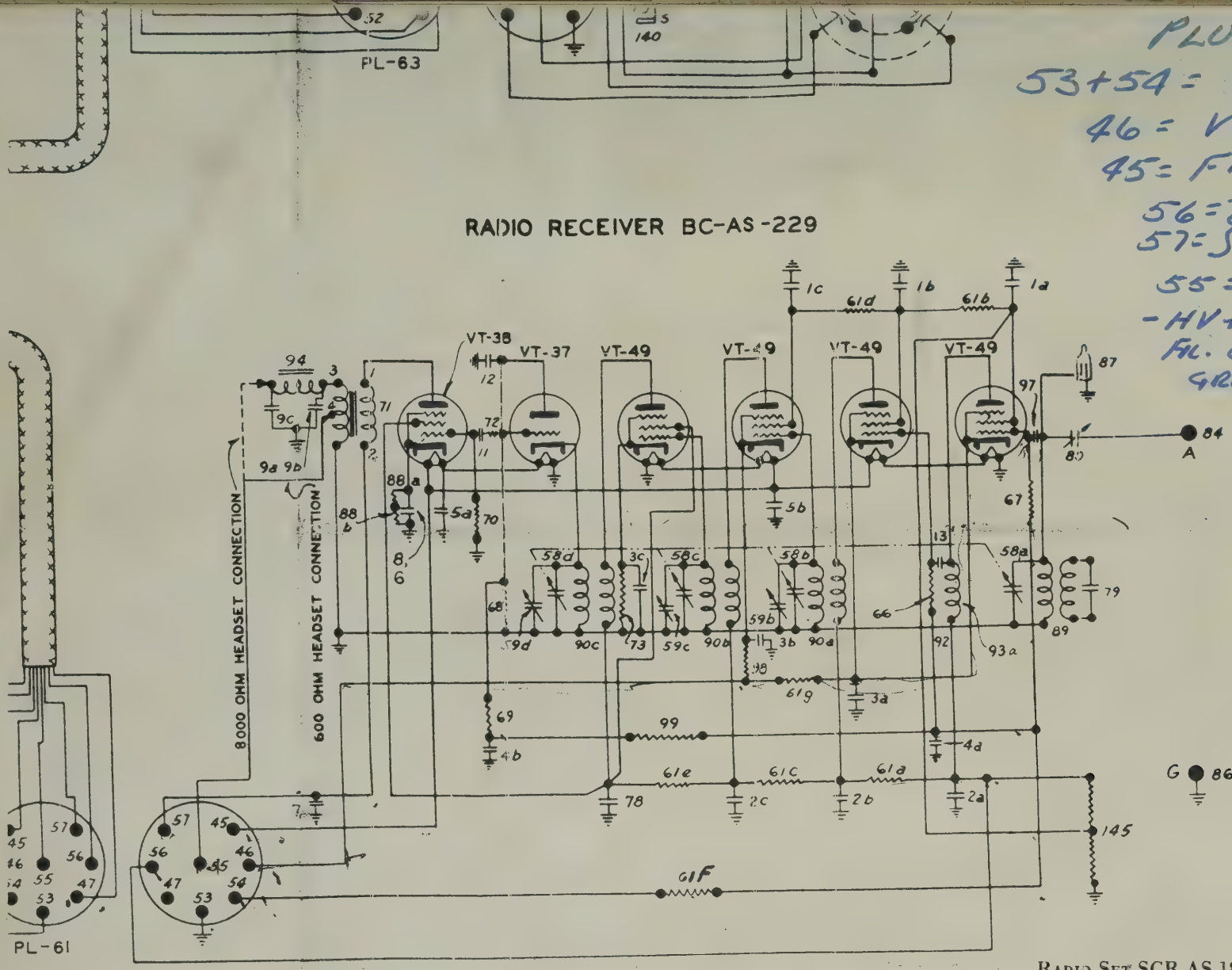
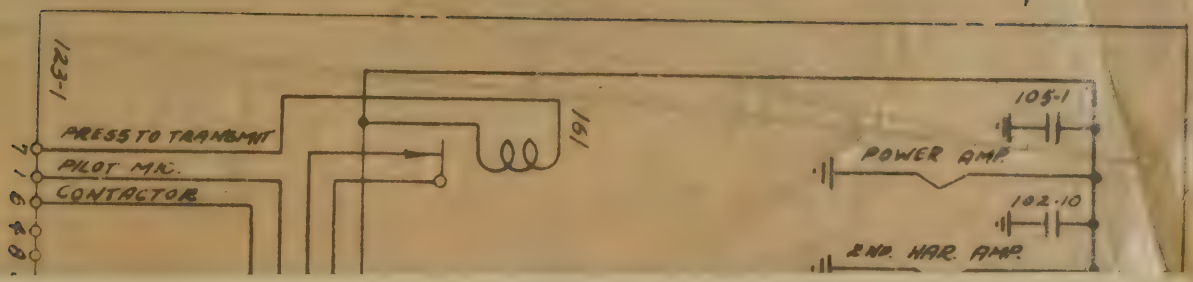


FIGURE 19-

RADIO SET SCR-AS-183, SCHEMATIC CIRCUIT DIAGRAM

47-N.C.
B+L-56-57-B+H
45-FIL.
46-K
54-G
55-53GND
→ OUT.



graph 14k for a more complete discussion). Potentiometer 125 serves as a GAIN control for transmitter modulation only. Tube VT-199 is cathode-biased by resistor 153-3 which is bypassed for audio frequencies by capacitor 110. Grid resistor 153-4 and cathode choke 162 block r-f energy from the sensitive speech amplifier. The plate is fed through audio choke 126 and is coupled to the primary of the interstage transformer 159 by capacitor 113. The frequency response is held to desirable values by plate-loading resistor 144 connected across the primary of transformer 159.

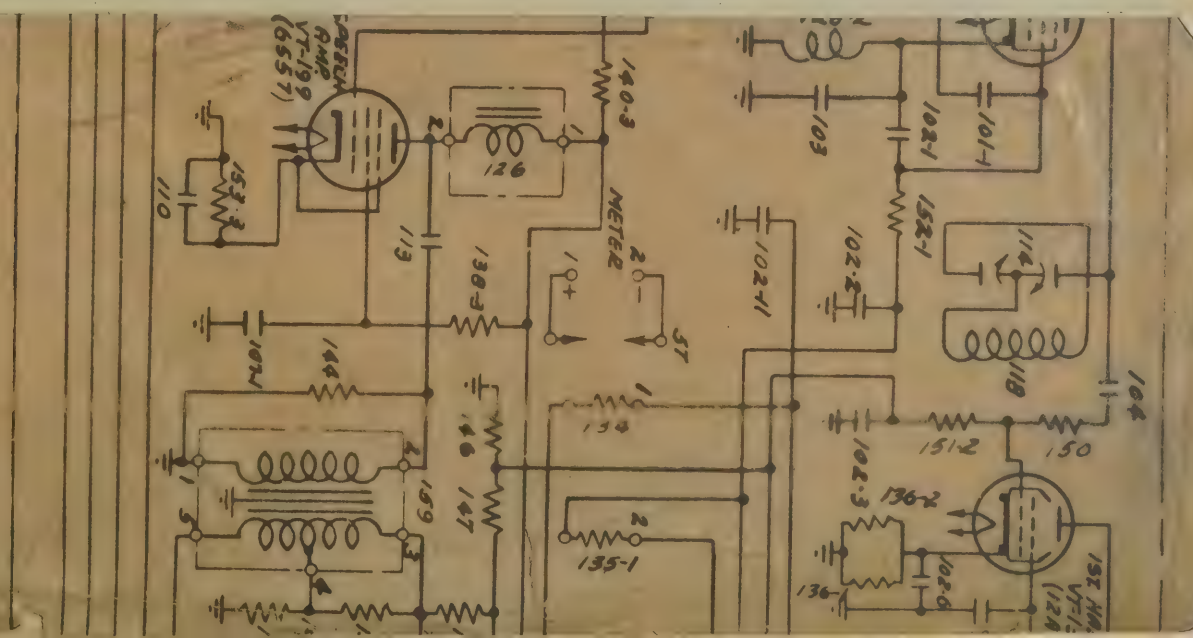
g. *Modulator*

The secondary of the interstage transformer 159 is connected to the grids of the push-pull modulator Tubes VT-134. Grid-bias voltage from the bias dividers 145, 152-3 and 152-4 is applied through the centertap terminal (No. 4) of the transformer secondary. Capacitor 109-5 is connected in parallel with the modulator grids and terminals 3 and 5 of the transformer 159 secondary and serves to reduce the high-frequency response and suppress oscillations in the modulator circuit. D-C plate voltage is applied through the centertap terminal (No. 2) of the primary of the modulator transformer 160. D-C screen voltage is obtained through terminal No. 2 of transformer 160 and dropping resistor 154-2. The audio voltage across the secondary terminals of transformer 160 modulates the plate input of power-amplifier Tube VT-118.

When the normally-open contactor relay 131 is energized, the output of the modulators is fed back to the speech-amplifier input circuit through resistors 140-2, 140-3, 140-4 and capacitor 108-2, thus producing audio oscillations of approximately 1000 cps, the frequency depending chiefly on the rate at which capacitor 105-3 discharges through resistor 142. This audio-frequency energy modulates the plate input of power-amplifier Tube VT-118 through modulator transformer 160.

h. *Contactor Circuit*

When the contactor switch is closed, contactor relay 131 is energized, and the slow-



graph 14k for a more complete discussion). Potentiometer 125 serves as a GAIN control for transmitter modulation only. Tube VT-199 is cathode-biased by resistor 153-3 which is bypassed for audio frequencies by capacitor 110. Grid resistor 153-4 and cathode choke 162 block r-f energy from the sensitive speech amplifier. The plate is fed through audio choke 126 and is coupled to the primary of the interstage transformer 159 by capacitor 113. The frequency response is held to desirable values by plate-loading resistor 144 connected across the primary of transformer 159.

g. *Modulator*

The secondary of the interstage transformer 159 is connected to the grids of the push-pull modulator Tubes VT-134. Grid-bias voltage from the bias dividers 145, 152-3 and 152-4 is applied through the centertap terminal (No. 4) of the transformer secondary. Capacitor 109-5 is connected in parallel with the modulator grids and terminals 3 and 5 of the transformer 159 secondary and serves to reduce the high-frequency response and suppress oscillations in the modulator circuit. D-C plate voltage is applied through the centertap terminal (No. 2) of the primary of the modulator transformer 160. D-C screen voltage is obtained through terminal No. 2 of transformer 160 and dropping resistor 154-2. The audio voltage across the secondary terminals of transformer 160 modulates the plate input of power-amplifier Tube VT-118.

When the normally-open contactor relay 131 is energized, the output of the modulators is fed back to the speech-amplifier input circuit through resistors 140-2, 140-3, 140-4 and capacitor 108-2, thus producing audio oscillations of approximately 1000 cps, the frequency depending chiefly on the rate at which capacitor 105-3 discharges through resistor 142. This audio-frequency energy modulates the plate input of power-amplifier Tube VT-118 through modulator transformer 160.

h. *Contactor Circuit*

When the contactor switch is closed, contactor relay 131 is energized, and the slow-

release relay 130 contacts remain unaffected for approximately 0.2 of a second. During this time a modulated c-w emission takes place on the transmitter channel which happens to be in use. Then relay 130 contacts are released, the radio set automatically shifts to channel D and the same m-c-w signal is emitted on channel D as long as the contactor switch remains closed. When the contactor switch is opened, the tone-modulated signal ceases and the radio set automatically shifts back to the channel which was in use before the m-c-w transmissions began. Contactor operation, as described above, occurs automatically at definite intervals and takes precedence over all other functions of the equipment.

i. *Meter Shunt Circuits*

The 6-position two-section METER SWITCH 157 is connected to a network of shunts [see Paragraph 5a (3)] which are listed here together with the currents they aid in measuring: shunt 134 for first harmonic-amplifier plate current, 135-1 for second harmonic-amplifier plate current

grid, the screen, and the suppressor grid of the r-f indicator tube are connected together to form the diode plate which terminates through load resistor 154-3 and bypass capacitor 105-2, and the plate in turn is capacitively coupled to the power-amplifier tank circuit. The test milliammeter, when connected across shunt 153-2, measures the plate-to-cathode rectified current in the r-f indicator diode, and since the amplitude of the diode current depends on the r-f voltage developed in the power-amplifier plate circuit, the test milliammeter will indicate tuning of the power-amplifier plate.

14. RADIO RECEIVER BC-624-A

a. *General*

Radio receiver BC-624-A is a superheterodyne receiver (see Figure 71) which operates in the frequency range 100-156 mc on any of four pre-set crystal-controlled channels. The intermediate frequency is 12 mc. Channels are selected by remote control only. For a general description of the receiver refer to Paragraph 5a(4).

RESTRICTED

RESTRICTED

LAFAYETTE

MODEL HE-15 — CITIZENS BAND TRANSCEIVER

* * *

OPERATING AND INSTALLATION INSTRUCTIONS

SPECIFICATIONS

RECEIVER

Superheterodyne continuously tuned from channel 1 thru 22. Full AVC.

SENSITIVITY: ..... 5 microvolts for 50 milliwatt output.

SELECTIVITY: ..... 7 KC at 6db down.

IMAGE REJECTION: ..... 35 db or better.

IF FREQUENCY: ..... 1750 KC.

NOISE GATE LIMITER: ..... Switched on-off.

AUDIO OUTPUT: ..... 3 watt, 4" Alnico V Speaker.

TRANSMITTER

POWER: ..... 5 watts input.

CHANNELS: ..... 5 switch selected transmit positions. Supplied with crystal for one channel. Widely tuned for full efficiency on all 22 channels.

MICROPHONE: ..... Hand-held microphone with 2 position slide switch; Position one — microphone in talk position; Position two — microphone in push-to-talk position.

ANTENNA MATCHING: ..... 30 to 100 ohms.

CONTROLS

Volume ON-OFF
Planetary Tuning
Transmit (Fixed) — Receive — Transmit (Spring Return)
Noise Limiter ON-OFF
RF Modulator Indicator
Crystal Selector
Power On-Off Indicator

Operates on 115 Volts AC (HE-15) and with separate power supplies on 6 volts DC (HE-18) and 12 Volts DC (HE-16). All power supplies internally fused.

POWER CONSUMPTION: ... 42 watts Receive; 45 watts Transmit.

SIZE: ..... 10½" W x 5¾" H x 6¾" D (Transceiver)
2¼" D x 5¼" W x 4¾" H (Power Supply)

The Lafayette Model HE-15 Transceiver is a combination transmitter and receiver for use in the 11-meter (Class D) Citizen's Radio Service. Designed to meet the Federal Communications Commission (FCC) requirements, the unit will provide economical and reliable radio communication in its intended application if installed and operated in accordance with instructions contained herein.

The transmitter may be operated on any channel in the 11-meter Citizen's Band (1-22). Provision has been made for the insertion of 5 crystals into the unit, any one of which may be selected by means of a 5-position selector switch. Crystals covering any of the 22 channels can very easily be inserted into the unit, but it should be noted that the FCC regulations specifically require that any adjustment made to any frequency-determining component in the transmitter be carried out under the supervision of, or by, a person holding a first or second class radiotelephone operators license. Insertion of crystals would fall into this category. Crystal controlled and plate modulated, the transmitter delivers the maximum allowable power input of 5 watts to the final RF amplifier.

The receiver utilizes a sensitive superheterodyne circuit with AVC and incorporates a switch controlled noise limiter. An RF stage precedes the detector for added sensitivity and selectivity and to keep RF radiation to a minimum. The receiver non-critically tunes to all 22 channels.

POWER SUPPLIES

The HE-15 may be operated from a 115 volt 60 cycle AC source or from a 6 or 12 volt DC battery source. Accessory power units are available for use with the transceiver when operated from 6 or 12 volts DC.

115V 60 cycle AC Source: An AC line cord, terminated at one end with a normal AC plug and at the other with an 11-pin socket, is supplied with the Transceiver. The 11-pin socket should be connected to the matching plug on the transceiver before inserting the AC plug into the wall outlet.

6V or 12V DC Source: Model HE-18 (6 volt) and Model HE-16 (12 volt) Power Units are available as external power supplies for the transceiver when 6 or 12 volt operation is desired.

ANTENNA INSTALLATION

Since the maximum allowable power input to the RF amplifier is fixed at 5 watts, the most important single factor determining optimum transmission is the antenna. The antenna chosen should be selected for each transceiver on the basis of the application involved.

FIXED ANTENNA INSTALLATION

For short range communication (1-3 miles) an inexpensive base loaded type of antenna (Lafayette Model HE-17) will be adequate. An antenna of the "ground plane" type will provide greater, more reliable coverage. Both of these types are essentially non-directional and are ideal for applications involving fixed-to-mobile operation.

The directional "beam" type of antenna may be used to extend the range of the Transceiver and will provide reliable communication over an unusually long range or under adverse weather conditions. Because of their directional properties these antennas are ideal for point-to-point communication, that is, from one fixed station to another.

The range of the transceiver also has a direct bearing on the height of the antenna used. Regardless of the type chosen, always locate the antenna as high as possible within the legal limits established by the FCC. (The regulations limit the height of the antenna to a maximum of 20 feet above the structure on which the antenna is mounted). It is important therefore, to choose a location for the transceiver that is favorable to your antenna location. A long lead-in cable will introduce a certain amount of power loss and should be avoided where possible unless the antenna location justifies its use. Up to 25 feet of cable lead-in may be used if it permits a favorable antenna location.

Wherever possible, use a good water pipe ground. In most cases this will provide greatly improved operation.

MOBILE ANTENNA INSTALLATION

The type of antenna best suited for mobile service is a vertically polarized whip antenna. In any mobile installation (cars, trucks, boats, etc.), an antenna system that is non-directional has to be used. Other factors likely to offset performance are lack of a good earth ground and ignition interference. However, the base-loaded type whip antenna will normally provide good results for short-range communications from 1 to 5 miles. Greater range and more reliable operation can be obtained with a full quarter-wave vertical whip antenna. Both of these types of antennas use the metal body of the vehicle as a "ground plane". If the transceiver is not mounted to any metal surface, it will be necessary to run a separate ground wire from the unit to a good metal ground in the vehicle. If installed in a boat the transceiver will not operate at maximum efficiency without a ground plate, unless your vessel has a steel hull. However, before installing the transceiver, consult a qualified marine technician regarding an adequate grounding system.

ANTENNA CONNECTIONS

The antenna lead-in cable RG-58/U, should be terminated with a UHF Type PL-259 connector. The receptacle located on the transceiver accepts this type of connector.

The Lafayette antenna model number HE-17 may be connected directly to the transceiver if desired. This will require the use of a Military type M-359 or M-359A right-angled adapter. Simply connect the adapter to the antenna socket on the transceiver and then insert the antenna into the adapter.

IGNITION INTERFERENCE

Engine ignition interference in a car or truck should not present a serious problem. The suppression carried out on vehicles equipped with a standard broadcast radio will normally suffice. However, if an ignition interference problem is present, any skilled auto radio repairman should be able to correct it for you.

Electrical noise from engines and other electrical equipment aboard a boat or vessel can render your transceiver useless. The worst offender will be the ignition system of gasoline engine powered boats. Generators on both gasoline and diesel engines, auxiliary generators, electric motors on refrigerators, bilge pumps, fans, etc., must be filtered for quiet radio reception.

Unfortunately, there is no hard and fast rule for the elimination of noise. It is best to attack the problem systematically. The ignition system can be filtered by the use of a "spark shield" made to fit most common gasoline marine engines. These shields are easily installed and can be removed for spark plug and point servicing in less than a minute.

Auxiliary generators are quieted down by condenser installations. Condensers of the highest quality, in metal cans, should be used. We recommend that a capacity of 1.0 mfd be used. These are of greater capacity than the condensers normally used in automobile radio installations. The same condensers can be used to filter the other motors. Condensers are installed at the generator armature terminal or, in extreme cases, directly on each brush holder. The metal can is connected to the generator frame. Never connect a condenser to the field terminal of a generator.

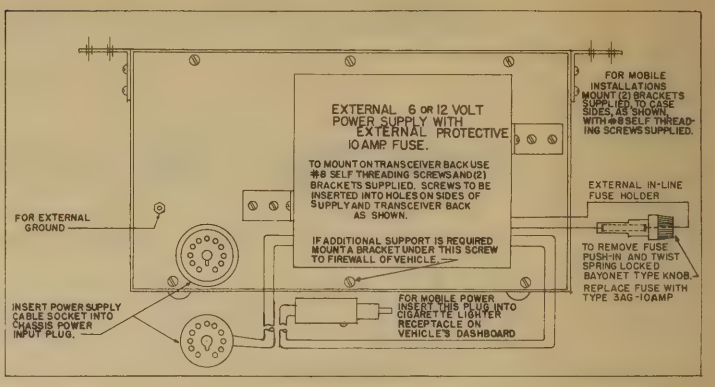
The voltage regulator on the larger generators is frequently a source of troublesome noise. Before attempting any filtering on the regulator, have the unit cleaned and adjusted by an expert. If noise is still present, install condensers on the armature terminal of the regulator. Again, do not put a condenser on the field terminal.

Another, more infrequent source of noise is caused by the rotation of the propeller shaft in its various bearings. This rotation causes static electricity discharge. If noise is present when the vessel or boat is underway but goes away when you throw the engine out of gear, you most probably have "shaft noise". This noise can usually be eliminated by installing phosphor bronze "fingers" in such a way as to allow wiping contact with the shaft. The finger is then connected to the engine block with a heavy wire.

Diesel engines have no ignition system and therefore need no shields. The generators must be filtered just as they are for gasoline engines.

Other electrical accessories such as fans, bilge pumps, electric toilets, fresh water system motors, etc., are also a possible source of noise. These units can be noise suppressed by means of condensers.

MOBILE INSTALLATION OF TRANSCEIVER


EXTERNAL 6 OR 12 VOLT POWER SUPPLY WITH EXTERNAL PROTECTIVE 10 AMP FUSE.
TO MOUNT ON TRANSCEIVER BACK USE #8 SELF THREADING SCREWS AND (2) BRACKETS SUPPLIED. SCREWS TO BE INSERTED INTO HOLES ON SIDES OF SUPPLY AND TRANSCEIVER BACK AS SHOWN.
IF ADDITIONAL SUPPORT IS REQUIRED MOUNT A BRACKET UNDER THIS SCREW TO FIREWALL OF VEHICLE.
FOR MOBILE INSTALLATIONS MOUNT (2) BRACKETS SUPPLIED TO CASE SIDES AS SHOWN, WITH #8 SELF THREADING SCREWS SUPPLIED.
EXTERNAL IN-LINE FUSE HOLDER
FOR EXTERNAL GROUND
TO REMOVE FUSE PUSH-IN AND TWIST SPRING LOCKED BAYONET TYPE KNOB.
REPLACE FUSE WITH TYPE 3AG-10AMP
INSERT POWER SUPPLY CABLE SOCKET INTO CHASSIS POWER INPUT PLUG.
FOR MOBILE POWER INSERT THIS PLUG INTO CIGARETTE LIGHTER RECEPTACLE ON VEHICLE'S DASHBOARD

Before installing the transceiver in a car, truck, boat, etc., be sure to choose a location which is convenient to the operating controls, and will not interfere with the normal functions of the driver. In most installations, the power unit can be mounted directly to the rear of the transceiver by means of 2 mounting brackets and 8 self-threading screws as shown in the illustration. Connect the 11-pin socket at the end of the power cable to the corresponding input plug at the rear of the transceiver.

The transceiver may then be mounted to the underside of the instrument panel or dashboard of a car,truck, etc., by means of the 2 remaining brackets and 8 self-threading screws. A third bracket (not supplied) may be used as shown if additional support is required. If desired, the power unit can be mounted separately, using the two brackets to mount it directly to the mounting surface. The power unit is equipped with a power input cable terminated with a plug which may be inserted directly into the cigarette lighter socket on a car or truck. A 10 amp 12 volt fuse is incorporated in the power unit. In a more permanent installation the plug should be removed and the cable connected to main battery source. A convenient place to make this connection would be the ignition switch. In this manner, the power supply to the transceiver will be controlled by the position of the ignition key. This will prevent unauthorized persons from using the transceiver and also prevent the transceiver from being left on.

OPERATING INSTRUCTIONS

This transceiver has been designed for use in class "D" operation in the 11-meter citizens radio service. It is designed to meet the Federal Communications Commission requirements applicable to equipment operating in this service under class "D" emission, and not to be used for any other purpose. Part 19 of the FCC regulations defines operation in this service, and you are required to read and understand these regulations prior to operating this equipment. Copies of Manual VI (covering the FCC regulations for Amateur and Citizen's Band Radio Service) include part 19 and are available for $1.25 from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. You are also required to submit a completed copy of FCC Form 505 prior to operating this equipment on the air. YOU WILL BE IN VIOLATION OF PART 19 OF THE REGULATIONS IF YOU OPERATE THIS EQUIPMENT ON THE AIR PRIOR TO RECEIVING YOUR LICENSE AND CALL SIGN.

CAUTION

If you install your own transceiver, do not attempt to make any adjustments to the transmitter part of the transceiver. This is strictly prohibited by the FCC, to any and all who do not have a proper, current and valid license. You will notice in Part 19 of the regulations that any adjustments made to the transmitter while on the air which might result in operation of a spurious frequency must be made under the supervision of, or by, a person holding a first or second class radiotelephone operator's permit or license.

DESCRIPTION OF CONTROLS

VOLUME CONTROL — Varies the sound output from the loudspeaker. Also incorporates an on-off switch at the most counter-clockwise end of rotation.

TUNING CONTROL — Provides receiver tuning of channels 1 through 22. The small outer knob operates the larger panel knob through a reduction drive to provide fine tuning when necessary.

TRANSMIT-RECEIVE SWITCH — Normal position is in REC, placing the receiver section in operation. The lower TRANSMIT position permits short transmissions of an intermittent nature. When released, the control will return to the REC position automatically. The upper TRANSMIT position permits continuous transmission for longer periods of time, without applying continuous pressure to the control. Both TRANSMIT positions perform the same basic functions.

CRYSTAL SELECTOR SWITCH — Selects any one of 5 channels (if 5 crystals have been inserted). As a consequence of its design, this equipment normally requires no adjustment or retuning of the transmitter section when switching from one channel to another. The transmitter may be operated with only one crystal installed, provided the selector switch is set to the position which places it in circuit (normally position 1). Crystals for any channel in the band may be installed provided that they are within .005% accuracy and are installed under the supervision of, or by, a person holding a first or second class radiotelephone operator's license. A list of channels and their respective frequencies are provided below.

CLASS-D CITIZEN'S BAND CHANNELS AND FREQUENCIES

CHANNEL	MC	CHANNEL	MC
1	26.965	12	27.105
2	26.975	13	27.115
3	26.985	14	27.125
4	27.005	15	27.135
5	27.015	16	27.155
6	27.025	17	27.165
7	27.035	18	27.175
8	27.055	19	27.185
9	27.065	20	27.205
10	27.075	21	27.215
11	27.085	22	27.225

NOISE LIMITER SWITCH — May be used to reduce excessive noise (such as that caused by auto ignition) in those cases where the noise is greater in intensity than the signal. Use this control only when necessary, since it tends to reduce the overall efficiency of the receiver.

TRANSMITTING

Be sure that the power supply for the transceiver has been connected as instructed earlier, and that the unit has an adequate ground (if not mounted to a metal surface). One of the antenna systems discussed earlier should be connected. Plug the microphone into the jack provided on the extreme right of the front panel. For normal use, the switch on the microphone should be set to the "talk" position.

1. Turn the Transceiver on, and set the TUNING control to the channel on which you wish to operate. The Power indicator lamp will light if power has been applied to the unit.

2. Set the CRYSTAL SELECTOR to the required position for transmission on the desired channel.

3. Set the TRANSMIT-RECEIVE control to the lower transmit position. The RF indicator lamp will light, indicating the presence of RF in the transmitter section. Hold the microphone 4 to 8 inches away and speak in a normal tone of voice. Shouting will not increase the strength of your signal. Speak clearly and slower than you would normally. As you speak into the microphone you will notice that the RF indicator will "flicker", giving an indication that the speech amplifier and modulator circuits are operating properly. Release the transmit control at the completion of your message. Use the fine tuning control (small outer knob) to tune in the answering station if necessary.

GENERAL OPERATING INFORMATION

Remember, the Citizens Radio Service is not similar to the Amateur Radio Service with respect to permissible communications and that amateur type communications such as calling CQ, working distant stations for the fun of talking to someone that far away, etc., are not permissible under any circumstances.

Transmissions should be brief as possible and only made after due consideration for others using the same channel. You should remember too, that the person who is transmitting cannot hear comments made by the listener since the receiver at the transmitting end is inoperative when the transmitter is being used.

Finally, it is the user's responsibility to see that his equipment is operating at all times in accordance with the Citizens Radio Service rules. Off-frequency operation can be guarded against by having the transceiver checked by a service engineer or other person who has the proper equipment and skill required to use it (provided they hold a first or second class radiotelephone license).

INSTALLATION OF CRYSTALS

Access to the crystal holders is obtained by removing the plate on the front of the transceiver. Numbering from left to right are crystal holders 1 to 5. These are selected by the corresponding positions of the Crystal Selector switch. The Model HE-15 is normally supplied with a crystal for channel 9 (27.065 MC) already installed in holder No. 1. Additional crystals for other channels may be inserted, provided that their installation is carried out under the supervision of, or by, a person holding a first or second class radiotelephone operators license.

SHIPPING INSTRUCTIONS

If the unit must be returned for adjustment or service, attach a tag to the unit bearing your name and complete address. Include, either in a letter or on the tag itself, the reason for returning the unit and a brief description of the difficulties encountered.

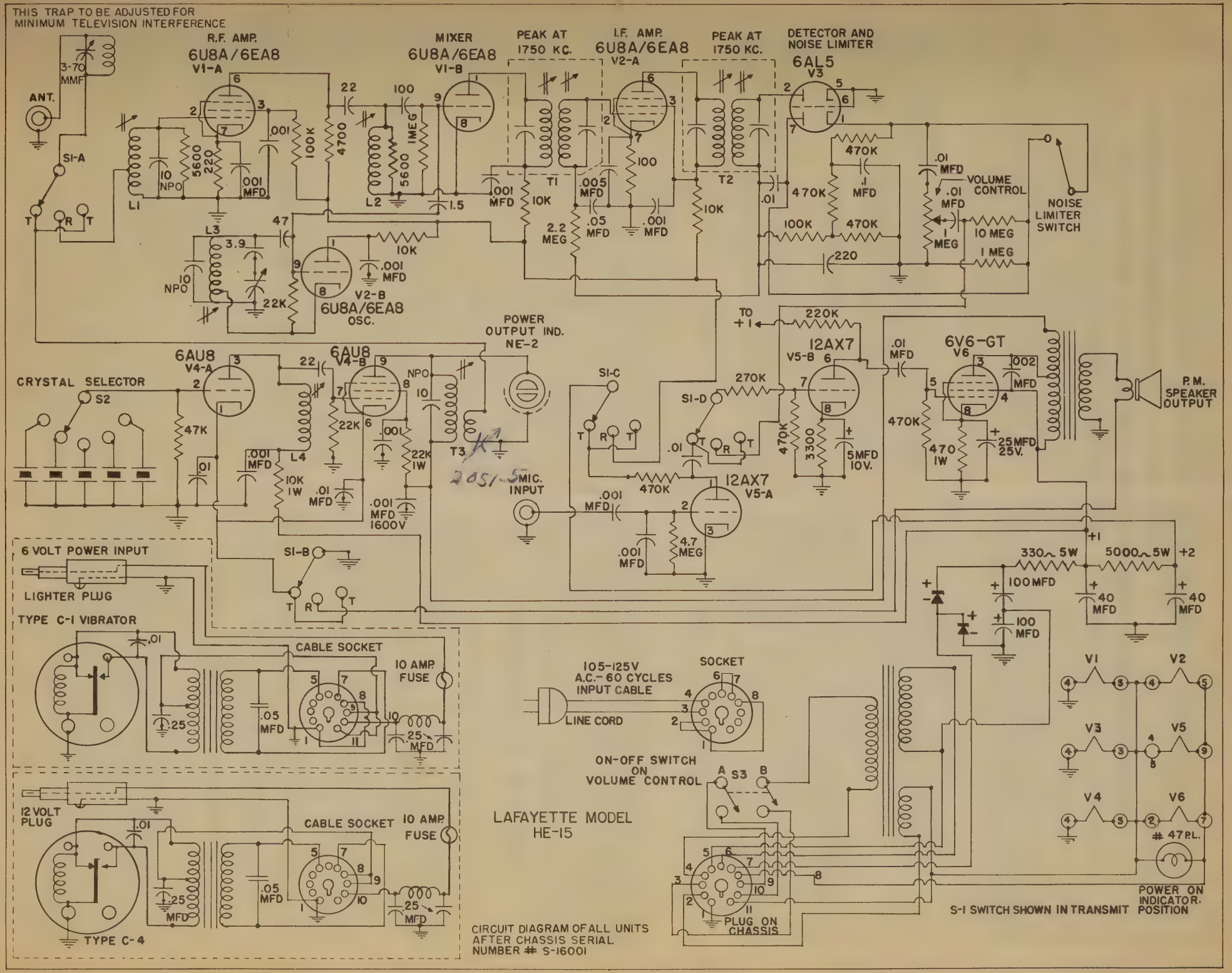
Wrap the unit in heavy paper before placing into the carton which should be large enough to permit the use of at least three inches of shredded paper or excelsior between all sides of the unit and the carton. Mark the carton FRAGILE and clearly address it as follows: —

TO:

LAFAYETTE RADIO CORP.
165-08 LIBERTY AVE.
JAMAICA 33, N. Y.

Include your own name and address on the carton and ship by prepaid express. The unit will be returned to you by express collect. Bear in mind that the carrier will disclaim responsibility for damage if, in his opinion, it was caused by improper packing.

LAFAYETTE RADIO ELECTRONICS CORPORATION CERTIFIES THAT THIS EQUIPMENT HAS BEEN DESIGNED, MANUFACTURED AND FURNISHED IN ACCORDANCE WITH THE SPECIFICATIONS CONTAINED IN SUBPARAGRAPHS (1), (2), (3), (4), (5), OF PART 19.71 (C) OF THE FCC RULES AND REGULATIONS AS AMENDED EFFECTIVE 11-15-59.


THIS TRAP TO BE ADJUSTED FOR MINIMUM TELEVISION INTERFERENCE
R.F. AMP. 6U8A/6EA8 V1-A
MIXER 6U8A/6EA8 V1-B
PEAK AT 1750 KC.
I.F. AMP. 6U8A/6EA8 V2-A
PEAK AT 1750 KC.
DETECTOR AND NOISE LIMITER 6AL5 V3
ANT.
3-70 MMF
SI-A
T R T
L1
L2
L3
T1
T2
10 NPO
5600
220
.001 MFD
100K
4700
22
100
1MEG
1.5
47
3.9
22K
10K
.001 MFD
2.2 MEG
.005 MFD
.05 MFD
100
470K
.1 MFD
.01 MFD
VOLUME CONTROL
1 MEG
10 MEG
NOISE LIMITER SWITCH
220
V2-B 6U8A/6EA8 OSC.
POWER OUTPUT IND. NE-2
TO +1
220K
12AX7 V5-B
270K
6V6-GT V6
.002 MFD
P.M. SPEAKER OUTPUT
470K
470 1W
25 MFD 25V.
3300
5 MFD 10V.
6AU8 V4-A
6AU8 V4-B
CRYSTAL SELECTOR S2
47K
.01
.001 MFD
L4
10K 1W
22K 1W
.001 MFD 1600V
T3
2051-5
MIC. INPUT
SI-C
SI-D
12AX7 V5-A
4.7 MEG
6 VOLT POWER INPUT
LIGHTER PLUG
SI-B
TYPE C-1 VIBRATOR
CABLE SOCKET
10 AMP FUSE
.25 MFD
.05 MFD
105-125V A.C.- 60 CYCLES INPUT CABLE
LINE CORD
SOCKET
ON-OFF SWITCH ON VOLUME CONTROL
S3
12 VOLT PLUG
TYPE C-4
PLUG ON CHASSIS
330~ 5W
5000~ 5W
100 MFD
40 MFD
+1
+2
V1
V2
V3
V5
V4
V6
47 P.L.
POWER ON INDICATOR.
S-1 SWITCH SHOWN IN TRANSMIT POSITION
LAFAYETTE MODEL HE-15
CIRCUIT DIAGRAM OF ALL UNITS AFTER CHASSIS SERIAL NUMBER # S-16001

LAFAYETTE RADIO ELECTRONICS

MODEL HE - 90 CITIZENS BAND TRANSCEIVER

* * *

OPERATING AND INSTALLATION INSTRUCTIONS

SPECIFICATIONS

RECEIVER

Superheterodyne with 6 crystal-controlled receiving channels or continuously tuned from channel 1 thru 23. Built-in squelch control with automatic noise limiter and full AVC. Illuminated channel tuning dial.

I.F. FREQUENCY:	1650 KC.
NOISE GATE LIMITER:	Series Type.
AUDIO OUTPUT:	3 Watt, 4" Alnico V Speaker
TUBE COMPLEMENT:	1-6DS4 RF Amplifier 1-6EA8-Mixer Local Osc. 1-6AU6-1st IF Amplifier *1-6EA8-2nd IF & Mic. Ampl. *1-6T8-ANL, 2nd Det, AGC, Squelch and Audio Amplifier *1-6AQ5-Audio Output & Mod. *-tubes common to xmtr. & rcvr.

TRANSMITTER

CHARACTERISTICS:	Oscillator using 3rd Overtone crystal control. Input Power – 5 watts, Amplitude Modulation Pi-Network Output
CHANNELS:	6 switch selected transmit positions. Supplied with crystal for one channel. Widely tuned for full efficiency on all 23 channels.
MICROPHONE:	Hand held 2 position ceramic microphone; Position one – microphone in receive position; Position two – microphone in transmit position. Spring return switch.
ANTENNA MATCHING:	30 to 100 ohms.
TUBE COMPLEMENT:	6AW8A Xtal osc and RF amplifier.

CONTROLS

VOLUME ON-OFF	Spot switch
PLANETARY TUNING	meter switch
SQUELCH CONTROL	"IP" and phone jacks
	tune – crystal switch
CHANNEL SELECTOR:	6 crystal controlled fixed transmitting and receiving channels. 23 channel tuneable receiver.
RF METER INDICATOR:	2 position switch controlled. Position one – reads Transmitter RF output power. Position two – "S" meter with built-in zero adjustment control.
POWER CONSUMPTION:	115 Volts AC 60 cycles 47 Watts Receive 60 Watts Transmit
SIZE:	6 5/8D by 11 3/8W by 5H

INPUT SUPPLY

The HE–90 may be operated from a 115 volt 50-60 cycle AC source or from a 6 or 12 volt battery source. Accessory power units are available for use with the transceiver when operated from 6 or 12 volts DC.

115V 50-60 cycle AC Source: An AC line cord, terminated at one end with a normal AC plug and at the other with an 11-pin socket, is supplied with the Transceiver. The 11-pin socket should be connected to the matching plug on the transceiver before inserting the AC plug into the wall outlet.

6V or 12V DC Source: Model [illegible] (6 Volt) and Model HE–91 (12 Volt) Power Units are available as external power supplies for the transceiver when 6 or 12 volt operation is desired. Make certain that the proper power supply is used before connecting to battery power.

INSTALLATION OF ANTENNA

Since the maximum allowable power input to the RF amplifier is fixed at 5 watts, the most important single factor determining optimum transmission is the antenna. The antenna chosen should be selected for each transceiver on the basis of the application involved.

INSTALLATION OF FIXED ANTENNA

For short range communication (1-3 miles) an inexpensive base load type of antenna or spiral whip antenna will be adequate. An antenna of the "ground plane" type will provide greater more reliable coverage. Both of these types are essentially non-directional and are ideal for applications involving fixed-to-mobile operation.

The directional "beam" type of antenna may be used to extend the range of the Transceiver and will provide reliable communication over an unusually long range or under adverse weather conditions. Because of their directional properties these antennas are ideal for point-to-point communication, that is, from fixed station to another.

The range of the transceiver also has a direct bearing on the height of the antenna used. Regardless of the type chosen, always locate the antenna as high as possible within the legal limits established by the FCC. (The regulations limit the height of the antenna to a maximum of 20 feet above the structure on which the antenna is mounted). It is important therefore, to choose a location for the transceiver that is favorable to your antenna location. A long lead-in cable will introduce a certain amount of power loss and should be avoided where possible unless the antenna location justifies its use. Up to 100 feet of cable lead-in may be used if it permits a favorable antenna Location.

Wherever possible, use a good water pipe ground. In most cases this will provide greatly improved operation.

INSTALLATION OF MOBILE ANTENNA

The type of antenna best suited for mobile service is a vertically polarized whip antenna. In any mobile installation (Cars, trucks, boats, etc.), an antenna system that is non-directional has to be used. Other factors likely to offset performance are lack of a good earth ground and ignition interference. However, the base-loaded type whip antenna will normally provide good

results for short-range communications from 1-5 miles. Greater range and more reliable operation can be obtained with a full quarter-wave vertical whip antenna. Both of these types of antennas use the metal body of the vehicle as a "ground plane". If the transceiver is not mounted to any metal surface, it will be necessary to run a separate ground wire from the unit to a good metal ground in the vehicle. If installed in a boat the transceiver will not operate at maximum efficiency without a ground plate, unless your vessel has a steel hull. However, before installing the transceiver, consult a qualified marine technician regarding an adequate grounding system.

ANTENNA TERMINATION

The antenna lead-in cable, RG-58/U, should be terminated with a UHF type PL-259 connector. The receptacle, SO-239, located on the transceiver accepts this type of connector.

When using a base loaded antenna use a 90 degree right-angle plug adapter type M-359 between transceiver receptacle and base loaded antenna.

IGNITION INTERFERENCE

Engine ignition interference in a car or truck should not present a serious problem. The suppression carried out on vehicles equipped with a standard broadcast radio will normally suffice. However, if an ignition interference problem is present, any skilled auto radio repairman should be able to correct it for you.

Electrical noise from engines and other electrical equipment aboard a boat or vessel can render your transceiver useless. The worst offender will be the ignition system of gasoline engine powered boats. Generators on both gasoline and diesel engines, auxiliary generators, electric motors on refrigerators, bilge pumps, fans, etc., must be filtered for quiet radio reception.

Unfortunately, there is no hard and fast rule for the elimination of noise. It is best to attack the problem systematically. The ignition system can be filtered by the use of a "spark shield" made to fit most common gasoline marine engines. These shields are easily installed and can be removed for spark plug and point servicing in less than a minute.

Auxiliary generators are quieted down by condenser installations. Condensers of the highest quality, in metal cans, should be used. We recommend that a capacity of 1.0 mfd be used. These are of greater capacity than the condensers normally used in automobile radio installations. The same condensers can be used to filter the other motors. Condensers are installed at the generator armature terminal or, in extreme cases, directly on each brush holder. The metal can is connected to the generator frame. Never connect a condenser to the field terminal of a generator.

The voltage regulator on the larger generators is frequently a source of troublesome noise. Before attempting any filtering on the regulator, have the unit cleaned and adjusted by an expert. If noise is still present, install condensers on the armature terminal of the regulator. Again, do not put a condenser on the field terminal.

Another, more infrequent source of noise is caused by the rotation of the propeller shaft in its various bearings. This rotation causes static electricity discharge. If noise is present when the vessel or boat is underway but goes away when you throw the engine out of gear, you most probably have "shaft noise". This noise can usually be eliminated by installing phosphor bronze "fingers" in such a way as to allow wiping contact with the shaft. The finger is then connected to the engine block with a heavy wire.

Diesel engines have no ignition system and therefore need no shields. The generators must be filtered just as they are for gasoline engines.

Other electrical accessories such as fans, bilge pumps, electric toilets, fresh water systemmotors, etc., are also a possible source of noise. These units can be noise suppressed by means of condensers.

MOBILE INSTALLATION

Before installing the transceiver in a car, truck, boat, etc., be sure to choose a location which is convenient to the operating controls, and will not interfere with the normal functions of the driver. In most installations, the power unit can be mounted directly to the rear of the transceiver by means of 2 mounting brackets and 8 self-threading screws. Connect the 11-pin socket at the end of the power cable to the corresponding input plug at the rear of the transceiver.

The transceiver may then be mounted to the underside of the instrument panel or dashboard of a car, truck, etc., by means of the 2 remaining brackets and 8 self-threading screws. A third bracket (not supplied) may be used if additional support is required. If desired, the power unit can be mounted separately, using the two brackets to mount to it directly to the mounting surface. The power unit is equipped with a power input cable terminated with a plug which may be inserted directly into the cigarette lighter socket on a car or truck. A 10 amp fuse is incorporated in the power unit. In a more permanent installation the plug should be removed and the cable connected to main battery source. A convenient place to make this connection would be the ignition switch. In this manner, the power supply to the transceiver will be controlled by the position of the ignition key. This will prevent unauthorized persons from using the transceiver and also prevent the transceiver from being left on. It is imperative that the "hot" or center lead of this plug is connected to the ignition switch. If this wire is reversed, the fuse in the vehicle will blow. Polarity, however, is unimportant.

OPERATING INSTRUCTIONS

This transceiver has been designed for use in class "D" operation in the 11 meter citizens radio service. It is designed to meet the Federal Communications Commission requirements applicable to equipment operating in this service under class "D" emission, and not to be used for any other purpose. Part 19 of the F.C.C. regulations defines operation in this service, and you are required to read and understand these regulations prior to operating this equipment. Copies of Manual VI (covering the F.C.C. regulations for Amateur and Citizen's Band Radio Service) include part 19 and are available for $1.25 from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. You are also required to submit a completed copy of F.C.C. Form 505 prior to operating this equipment on the air. YOU WILL BE IN VIOLATION OF PART 19 OF THE REGULATIONS IF YOU OPERATE THIS EQUIPMENT ON THE AIR PRIOR TO RECEIVING YOUR LICENSE AND CALL SIGN.

T.V. INTERFERENCE TRAP

This Transceiver contains a built-in series-resonant trap in parallel with the antenna. When tuned correctly, it suppresses television interference. The trap is a filter which offers little opposition to the transmitter frequency but will help eliminate the second harmonic to which it is tuned. (54 MC.)

Turn on a TV receiver that you can see from your transmitting location, and tune to one of the three lower TV channels that has a station operating in your vicinity. If you notice a "cross-hatch" or "wavy-line" pattern on the screen while you are transmitting, it will be necessary to adjust the RF trap coil slug screw, (L5) in rear of cabinet to eliminate or minimize this interference. This will usually only be necessary when the transmitter antenna is located near the TV antenna, or that of a neighbor. This coil slug screw is located between the antenna input jack and the power input cable receptacle.

DESCRIPTION OF CONTROLS

VOLUME CONTROL AND POWER SWITCH: – Varies the sound output from the loudspeaker. Also incorporates an on-off switch at the most counterclockwise end of rotation.

TUNING CONTROL – Tuning is accomplished in the same manner as when using a standard broadcast band radio. Note: Receiver tuning has no effect on the frequency of transmission. The tuning control knob operates the illuminated dial scale and tuning condenser through a reduction drive to insure ease and accuracy in the selection of stations. This control works only when the RECEIVE selector knob is in the TUNE position.

CRYSTAL CHANNEL SELECTOR SWITCH – Note that there are six positions on the channel SELECTOR switch marked 1,

ADJUSTING THE RECEIVER I.F. SECTION

1. Adjust crystal channel selector knob to FIXED position No. 1 or to any other position in which the channel 7 crystal has been installed. (Both receiving and transmitting crystals must be in their proper sockets. See license label)
2. Turn volume and squelch control knobs fully "ON". (max. clockwise position)
3. Connect an A.C. voltmeter, having a 2.5 volt scale, between chassis and speaker voice coil lug near side of chassis. The built-in S-meter may also be used.
4. Connect a signal generator to Pin #2 of the V2 Mixer tube 6EA8. Low side of generator to chassis. High side of generator, through a 0.1 Mfd condenser to pin #2.
5. Adjust signal generator to 1650 Kc and peak I.F. transformers T3-T2-T1 for maximum gain on output meter.
6. The signal generator, modulated 30% with 400 cycles, should have an output as low as possible when making these adjustments.

ADJUSTING THE RECEIVER R.F. SECTION

1. Follow paragraphs 1-6 under adjusting the receiver I.F. section.
2. Connect a signal generator, that has the 27 Mc band spread out, so that 27.065 Mc (channel 9) may be accurately read to .005% tolerance. A crystal controlled signal generator is more desirable. The signal generator is to have a 52 ohm output impedance and is to be connected to the antenna input receptacle.

   Keep generator output as low as possible for these adjustments. An alternate; but poorer method of making these adjustments is to use the built-in spot switch on channel 9.
3. Turn xtal-tune switch S-3 to xtal position.
4. Tune L-7, the rcvr. osc. plate coil until a signal is heard. Note that the tuning of this coil is not sharp and should be set to the middle of the range where a signal is heard.
5. Unsolder one lead of the 10k resistor (Brn-Blk-Org) from the bottom of the mixer coil L-3.
6. Set the signal generator for maximum output signal. Dip coil L-6, the neutralization coil, for minimum reading on the meter.
7. Resolder the resistor and re-set the generator for a low output.
8. Now re-peak all i.f. transformers, top and bottom, for maximum meter reading.
9. Now peak the mixer coil, L-3, for maximum reading on the output meter.
10. Turn xtal-tune switch S-3 to tune position and set tuning dial to ch. 9 mark.
11. Turn rcvr osc. grid coil L-4 all the way in (clockwise). Now slowly turn it the other way until the signal is heard. Note that there may be several peaks of this coil but the correct one to use is the lower peak (slug most into coil).

WARRANTY

This transceiver is guaranteed to be free from defective materials and workmanship for a period of ninety days from date of purchase. We agree to remedy any such defects or to furnish new parts in exchange for any part of any unit of our manufacture which under normal installation or use in service discloses any defects, within the stipulated guarantee period. This unit must be delivered by the owner to us or to our representative from whom purchase was made, intact for our examination. All replacements for defective material will be made providing examination discloses in our judgment that it is thus defective. All transportation charges must be paid on merchandise returned to our factory for any cause whatsoever.

SHIPPING INSTRUCTIONS

If the unit must be returned for adjustment or service, attach a tag to the unit bearing your name and complete address. Include, either in a letter or on the tag itself, the reason for returning the unit and a brief description of the difficulties encountered.

Wrap the unit in heavy paper before placing into the carton which should be large enough to permit the use of at least three inches of shredded paper or excelsion between all sides of the unit and the carton. Mark the carton FRAGILE and clearly address it as follows: —

TO: LAFAYETTE RADIO CORP.
111 Jericho Turnpike
Syosset, L.I., N.Y.
Attn.: Service Dept.

Include your name and address on the carton and ship by prepaid express. The unit will be returned to you by express collect. Bear in mind that the carrier will disclaim responsibility for damage if, in his opinion, it was caused by improper packing.

REPLACEMENT PARTS-HE-90

T 5	POWER TRANSFORMER	PT-1015-2		RCVR VAR. CONDENSER	V-235 A-5
T 4	OUTPUT & MOD. TRANS.	T-184-6		XTAL TUNE SWITCH	8111-3
L1	TRANS OSC COIL	O-180-2	T1-3	I.F. TRANSFORMERS	I-110-5
L2	PI-NETWORK COIL	C-194-1		ELECTROLYTIC COND. (CAN)	E 237-1
L3,L7	RCVR. RF COIL	C-180-2		ELECTROLYTIC COND. (STRAP)	E 238-1
L4	RCVR OSC. COIL	O-189-4		VOLUME CONTROL & SWITCH	V-329-4
L6	RCVR. NEUT. COIL	C-1016-1		"S" METER ZERO POTENTIOMETER	P-325-3
	DIAL SCALE	DS-617A-4		MICROPHONE	M-879-1
	1/2 WATT RESISTORS	3029		MOLDED PAPER CONDENSERS	C 240
	1 WATT RESISTORS	3030		TUBULAR CERAMIC CONDENSERS	2012-C
	5 WATT RESISTORS	W 328	L5	T.V. TRAP COIL	C 191-2
	"S" METER IMA. D.C.	8109		NUVISTOR SOCKET 5-PIN	TS-880-1
	2 WATT RESISTORS	3036		500 UHY R.F. CHOKE	C-185-12

	SQUELCH CONTROL	V-339-1
	ANTENNA CONNECTOR-239	O-851-1
SR1-3	SILICON RECTIFIER	SR 846-2
	CRYSTAL SELECTOR SWITCH	BS 876-1
	AUDIO COUPLATE PC 70	2066-1
	DETECTOR COUPLATE PC 50	C 209-1
	PM SPEAKER	S 719-1
	TUNING KNOB	K 4005-21
	KNOBS	K 4005-22
	DIPPED MICA CONDENSERS	C 239
	FRONT PANEL	FP 9183-1
	CABINET AND BACK	C 9185-1
	SPEAKER GRILLE	SG-9184-1

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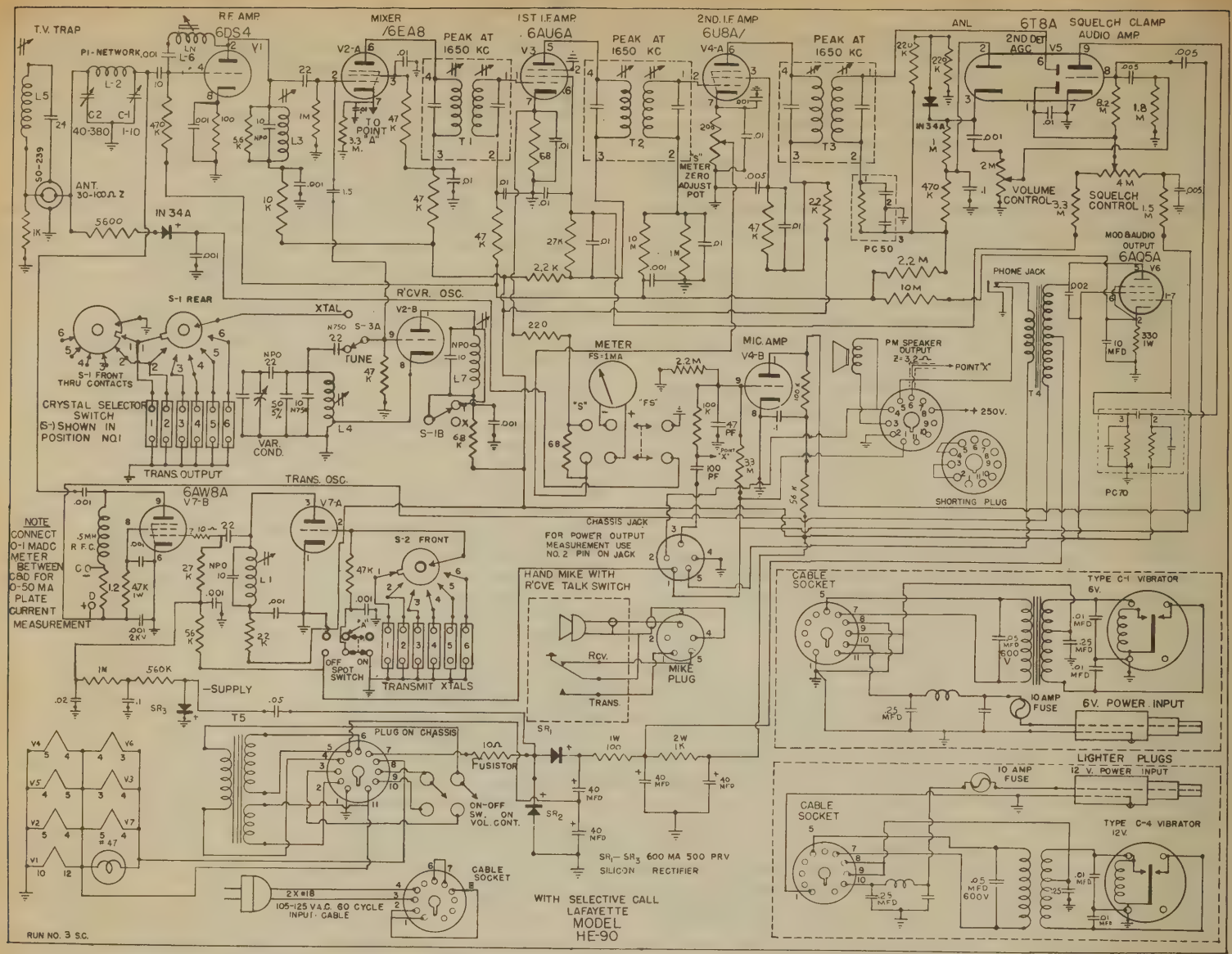


HE-90 WITH SELECTIVE CALL

This equipment is wired for selective calling and is equipped with an 11 pin receptacle to facilitate the installation of the LAFAYETTE HA-100, PRIVA-COM™.

Installation:

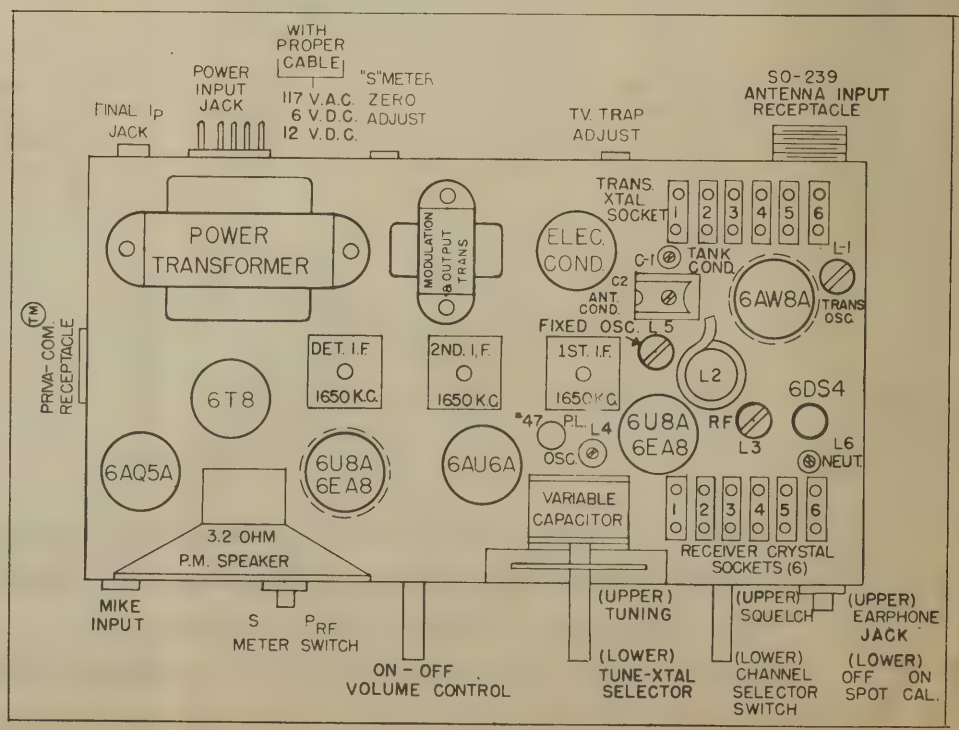
The HA-100, PRIVA-COM™ is packed with all the necessary brackets, hardware, and instructions.

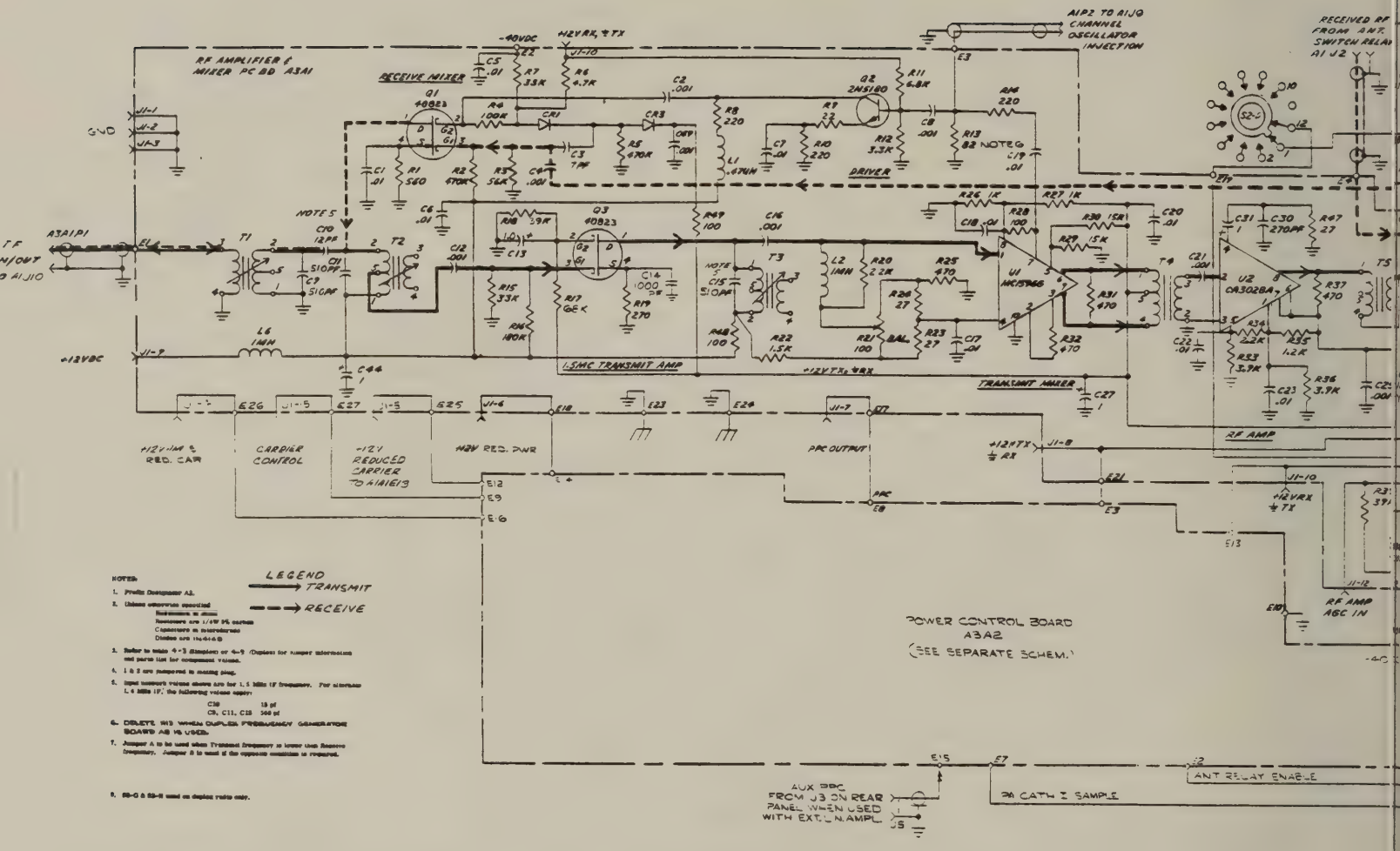
The holes necessary to mount the PRIVA-COM™ are provided on the right side of the cabinet.

1. Mount the PRIVA-COM™ on the cabinet of the HE-90. Follow the instructions packed with the HA-100 and use the hardware provided.

2. Locate the 11 contact receptacle, mounted on the left side of the HE-90, Remove the shorting plug. The shorting plug is provided to permit the normal operation of the HE-90, when the HA-100 PRIVA-COM™ is not installed.

3. Insert the HA-100 PRIVA-COM™ 11 pin plug into the 11 pin receptacle located on the right side of the HE-90 cabinet.




RF AMPLIFIER & MIXER PC BD A3A1
RECEIVE MIXER
DRIVER
1.5MC TRANSMIT AMP
TRANSMIT MIXER
RF AMP
-40VDC
+12VRX, +TX
A1P2 TO A1J9 CHANNEL OSCILLATOR INJECTION
RECEIVED RF FROM ANT. SWITCH RELAY A1 J2
A3A1P1
GND
+13VDC
+12V-IM & REC. CAR
CARRIER CONTROL
+12V REDUCED CARRIER TO A1A1E13
+12V REC. PWR
PAC OUTPUT
+12VTX & RX
+12VRX & TX
RF AMP AGC IN
ANT RELAY ENABLE
PA CATH I SAMPLE
AUX PAC FROM J3 ON REAR PANEL WHEN USED WITH EXT. L.N. AMPL
POWER CONTROL BOARD A3A2 (SEE SEPARATE SCHEM.)
LEGEND
TRANSMIT
RECEIVE
NOTES:
1. Prefix Designator A2.
2. Unless otherwise specified
Resistors are 1/4W 5% carbon
Capacitors in microfarads
Diodes are 1N4148
3. Refer to table 4-3 (Simplex) or 4-5 (Duplex) for jumper information and parts list for component values.
4. 1 & 2 are jumpered in mating plug.
5. Input transmit values shown are for 1.5 MHz IF frequency. For alternate L & MHz IF, the following values apply:
C30, C11, C18 18 pf
C9, C10, C12, C13 560 pf
6. DELETE W13 WHEN DUPLEX FREQUENCY GENERATOR BOARD A8 IS USED.
7. Jumper A is to be used when Transmit frequency is lower than Receive frequency. Jumper B is used if the opposite condition is required.
8. 50-G & 50-H used on duplex units only.

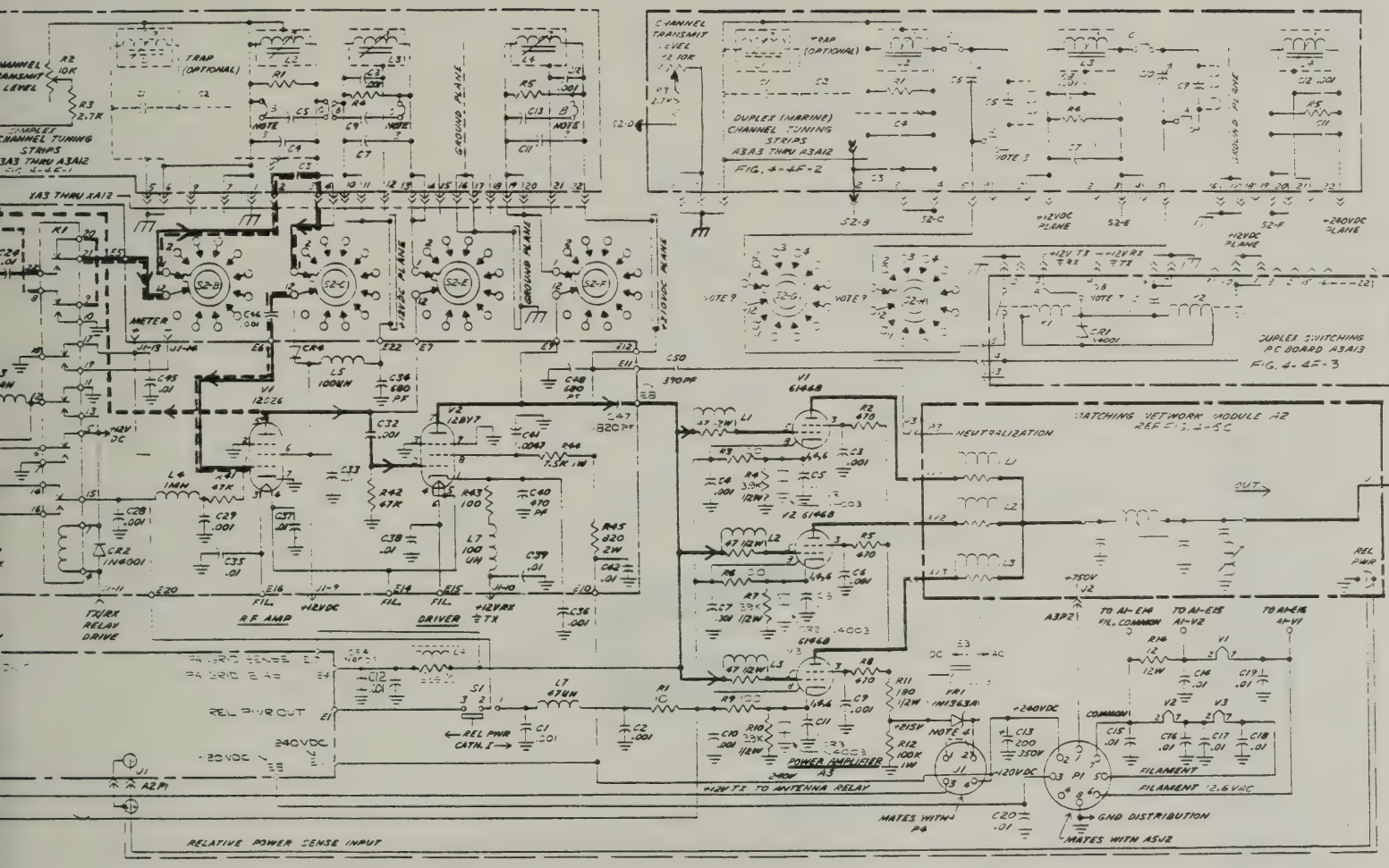


Figure 9-8. RF Amplifier Assembly A3, Schematic Diagram

IER ASSY A3

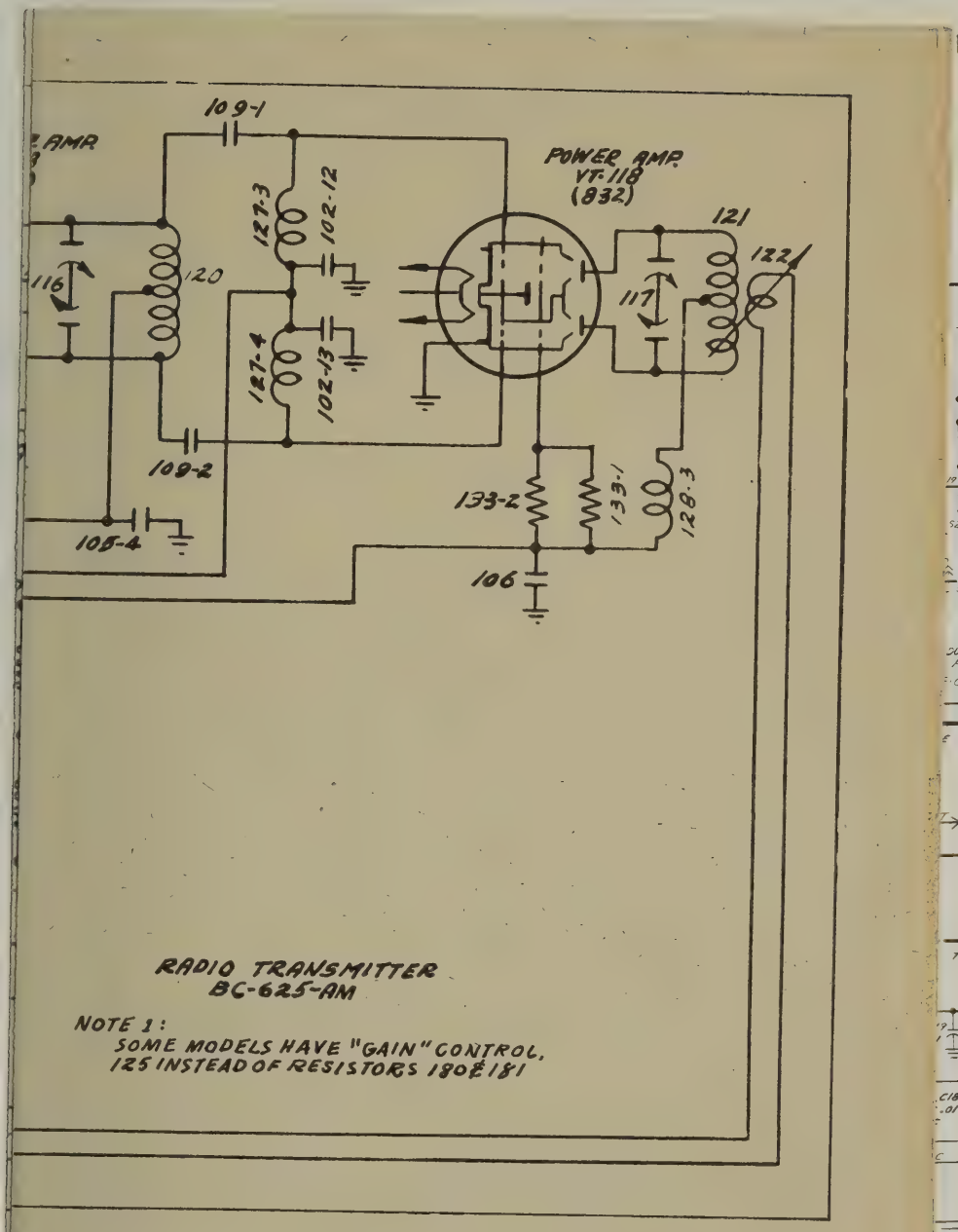
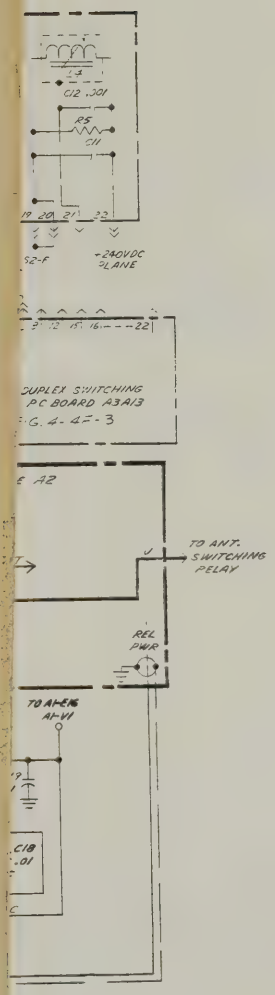


Figure 8-4—Radio Transmitter BC-625-AM—Schematic Diagram



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9-31/9-32

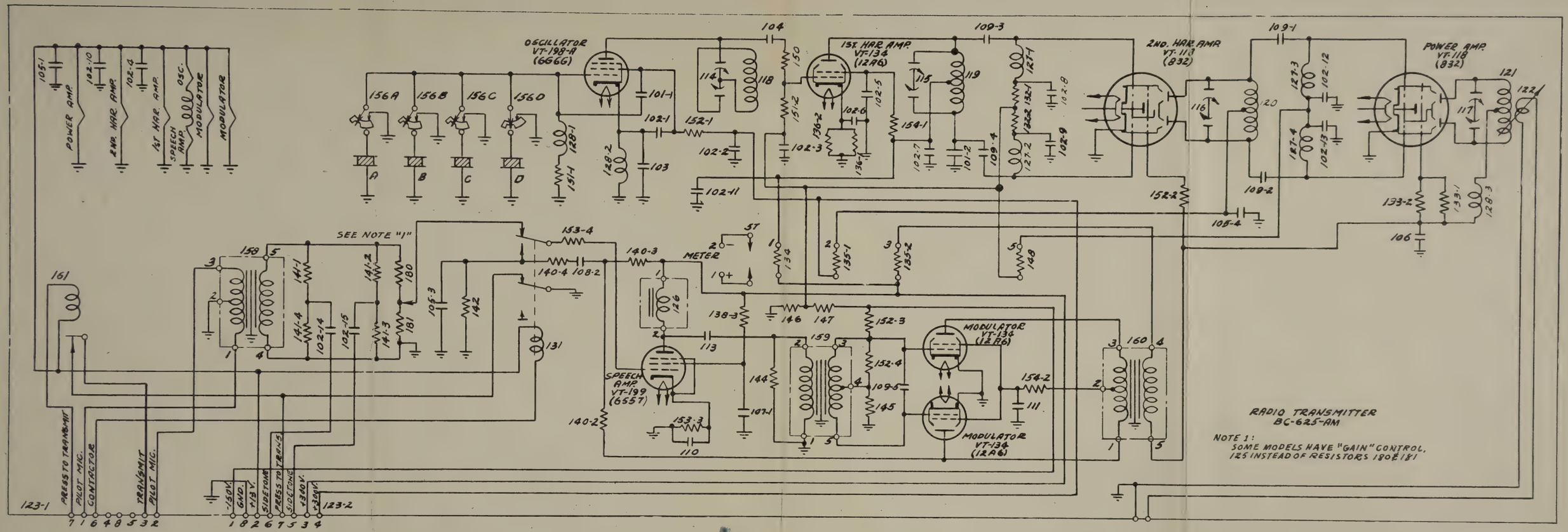


Figure 8-4—Radio Transmitter BC-625-AM—Schematic Diagram

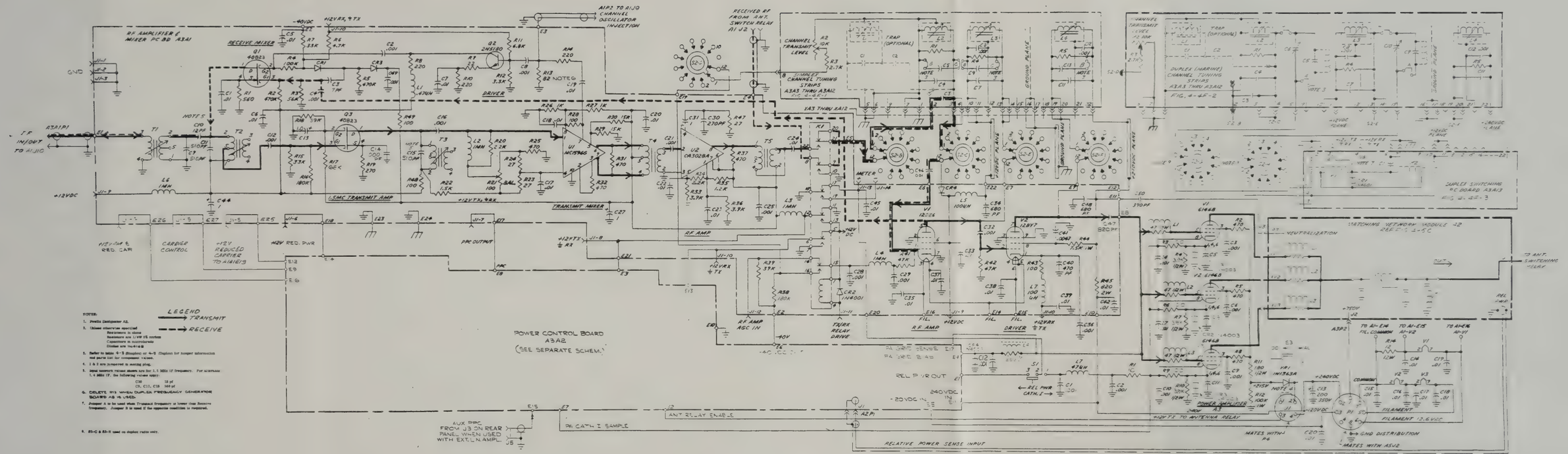

RF AMPLIFIER & MIXER PC BD A3A1
RECEIVE MIXER
DRIVER
1.5MC TRANSMIT AMP
TRANSMIT MIXER
RF AMP
RF AMP AGC IN
TX/RX RELAY DRIVE
RF AMP
DRIVER
POWER AMPLIFIER
POWER CONTROL BOARD A3A2 (SEE SEPARATE SCHEM.)
CHANNEL TRANSMIT LEVEL
CHANNEL TUNING STRIPS A3A3 THRU A3A12
DUPLEX (MARINE) CHANNEL TUNING STRIPS A3A3 THRU A3A12
DUPLEX SWITCHING PC BOARD A3A13
MATCHING NETWORK MODULE A2
NEUTRALIZATION
FILAMENT
FILAMENT 12.6VDC
GND DISTRIBUTION
MATES WITH A3J2
MATES WITH J1
MATES WITH J4
TO ANT. SWITCHING RELAY
TO ANTENNA RELAY
RELATIVE POWER SENSE INPUT
ANT RELAY ENABLE
PA CATH I SAMPLE
AUX PWR FROM J3 ON REAR PANEL WHEN USED WITH EXT. L.N. AMPL.
RECEIVED RF FROM ANT. SWITCH RELAY A1 V2
A1P2 TO A1J9 CHANNEL OSCILLATOR INJECTION
T.F. IN/OUT TO A1J10
+12VDC
GND
HI/LOW & RED. CAR
CARRIER CONTROL
+12V REDUCED CARRIER TO A1A1E13
+12V RED. PWR
PRC OUTPUT
LEGEND
TRANSMIT
RECEIVE
NOTES:
1. Prefix Designator A2.
2. Unless otherwise specified
Resistance in ohms
Resistors are 1/4W ±5 percent
Capacitors in microfarads
Diodes are 1N4148
3. Refer to table 4-3 (Simplex) or 4-5 (Duplex for bumper information and parts list for component values.
4. 1 & 3 are jumpered in mating plug.
5. Input network values shown are for 1.5 MHz IF frequency. For alternate 1.4 MHz IF, the following values apply:
C38 18 pf
C9, C11, C13 360 pf
6. DELETE R13 WHEN CRYSTAL FREQUENCY GENERATOR BOARD A3 IS USED.
7. Jumper A is to be used when Transmit frequency is lower than Receive frequency. Jumper B is used if the opposite condition is required.
8. E5-C & E5-E used on duplex radio only.

Figure 9-8. RF Amplifier Assembly A3, Schematic Diagram

CHAPTER 10
IF/AUDIO ASSEMBLY A4

TABLE OF CONTENTS

Paragraph 10.1	Theory of Operation
Paragraph 10.2	Optional Noise Limiter A4A1
----------	Parts List
Tables 10-1 thru 10-5	Voltage & Level Measurements
Figure 10-1	Noise Limiter Assy A4A1 Schematic
Figure 10-2	IF/Audio Board Assy View
Figure 10-3	IF/Audio Board Assy Schematic

10.1 THEORY OF OPERATION.

The IF/Audio Module A4, shown schematically in Figure 10-3 and pictorially in Figure 10-2, provides input and output signal processing from audio to the 1.5 MHz or alternate 1.4 MHz intermediate IF frequency. In transmit it accepts a 0 dBm, reduced to 100 mV by Transmit Audio level control, audio signal and converts it to a IF signal at -48 dBm. In receive it accepts a nominal 250 μV IF signal and converts it to a 0 dBm audio signal. Refer to Figure 10-3 for the following discussion.

Transmit. - Audio and carrier from the frequency generator board are mixed in U5, the transmit balanced modulator. T7 provides selective tuning and matching to the ssb filter input FL1. FL1 is nominally a 2.9 kHz mechanical filter. A 2.1 kHz filter is available as an option. This filter provides nominal opposite sideband rejection of 50 dB. After filtering the 455 kHz sideband signal is up converted to 1.5 MHz or alternate 1.4 MHz by bi-directional double balanced mixer T1, T2, CR1-CR4. Output is nominally -48 dBm to the RF Amplifier module. Transmit peak power control (PPC) is applied to Q1 to maintain output power at 150 Watts p.e.p. As a safety feature, power amplifier cathode current is also sensed and added to PPC to provide average control (APC) as a threshold type power compression. In this fashion the power amplifier is protected against both over voltage and over current. R1 controls the level of PPC compression.

For the AM and reduced carrier mode of transmission, Q29 acts as a gain control element controlling the carrier reinsertion to the second mixer input. Drive signal is obtained from the RF Amplifier Module (A3).

Q2 is the second LO injection buffer amplifier. It provides the drive necessary for the 1.5 MHz mixer. R3 sets the injection level.

No additional stages on the IF/Audio board are required for signal processing. The receive IF which bridges the transmit modulator, is placed in full AGC compression while in transmit.

Additional transmit functions are performed by Q24-Q27. Q24 provides for carrier reinsertion upon grounding of the ANTENNA/AM TUNE line. This line, available at a remote antenna coupler, provides for tune power, approximately 32 Watts, for antenna coupler alignment. Q25, C75, and R119 provide a 500 mS transmit to receive delay when the keyline is open. This may be reduced by removal of C75. Q26 is an inverter and Q27 the TR relay driver. The keyline inhibit line grounds the base of Q27 and prevents the transmitter from becoming energized when, in OFF, STANDBY, or RECEIVE and when the Antenna Coupler is tuning.

When in receive, the IF signal from the RF Amplifier is applied to bi-directional double balanced mixer T1, T2, CR1-CR4. A receive filter is selected, depending on mode, by Q3-Q7. Filter cutoff is accomplished by shunting, with the filter being cut off grounded at both the input and output. The am filter normally supplied is a double tuned circuit T8, T9. A mechanical 6 kHz am filter is available as an option.

The filter output is applied to IF amplifiers U1 and U2. This if output drives U3, the ssb product detector and am third if amplifier and U4, the agc if amplifier. At maximum gain (below agc threshold), if to audio gain is approximately 75 dB. In ssb product detector injection is supplied by carrier gate Q14. In am, injection is removed by disabling the oscillator in the frequency generator module A6. U3 output is buffered by Q17-Q18 which in conjunction with C67 provides envelope am detection. In ssb, Q19 shunts rf products out by grounding C66. Audio amplifier Q20-Q23 provides the necessary output for delivering a 0 dB line output and speaker amplifier driving power.

AGC amplifier U4 drives both agc detector CR12, CR11, C41, and agc dump detector Q13, C43. The purpose of the second agc detector is to allow a dual agc decay time constant. Upon removal of an input signal C41 discharges through R58. The time constant is several seconds. However, when the second detector agc voltage across C43, whose decay is faster but amplitude larger, falls below the reference set by R60 and R62, Q11 fires and C41 now decays to zero in approximately 200 mS. This in effect gives an agc time constant of five seconds but lasting for only 1.2 seconds and prevents the agc voltage, in ssb, from following the syllabic rate. Q8, the front end agc amplifier, supplies agc voltage to A3A1V1 and the S meter for signal strength indication.

10.2 OPTIONAL NOISE LIMITER BOARD A4A1.

The function of the noise limiter, located on the IF/Audio Module A4, is to prevent noise pulses from de-sensitizing the transceiver and to reduce undesirable noise from the receiver audio outputs. Refer to schematic diagram, Figure 10-1.

CR1 and CR2 detect negative and positive signals respectively and through C1R1 and C2R2 time constants generated dc voltage on C1 and C2 proportional to the average input signal. Noise pulses, both positive and negative, are therefore clipped by CR2 and CR1 relative to the average signal. Since noise pulses come in many variations of amplitude, frequency, and duration, a variable time constant is necessary to provide effective limiting over all operation conditions. FET Q1 provides the variable resistance required by front panel control R6. In the maximum ccw position the Noise Limiter is disabled. Maximum limiting occurs at the cw position. The limiting threshold is established by R127 on the IF/Audio Board.

IF/AUDIO PC BD ASSY

REF DESIG	DESCRIPTION	P/N
---	IF/AUDIO PC BOARD ASSEMBLY	200800
A4A1	Noise Limiter PC Board Assembly	200880
C1	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C2	Cap, mica, 470pF, 5%, 500 Vdcw	C06471
C3	Cap, mica, ___pF, 5%, 500 Vdcw	
	(for 1.5 MHz IF: 300pF)	C05301
	(for 1.4 MHz IF: 330pF)	C05331
C4	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C5	Cap, mica, ___pF, 5%, 500 Vdcw	
	(with 3.0 kHz filter: 130pF)	C05131
	(with 2.1 kHz filter: 390pF)	C05391
C6	Cap, mica, 2000pF, 5%, 500 Vdcw	C06202
C7	Cap, mica, ___pF, 5%, 500 Vdcw	
	(with LC AM filter: 130pF)	C05131
	(with ceramic AM filter: 560pF)	C06561
C8	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C9	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C10	Cap, tant, 10μF, 10%, 20 Vdcw	C41064
C11	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C12	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C13	Cap, mica, ___pF, 5%, 500 Vdcw	
	(with 3.0 kHz filter: 130pF)	C05131
	(with 2.1 kHz filter: 390pF)	C05391
C14	Cap, mica, ___pF, 5%, 500 Vdcw	
	(with LC AM filter: 130pF)	C05131
	(with ceramic AM filter: 390pF)	C05391
C15	Cap, mica, 2000pF, 5%, 500 Vdcw	C06202
C16	Cap, mica, 470pF, 5%, 500 Vdcw	C06471
C17	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C18	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C19	Cap, mica, 820pF, 5%, 500 Vdcw	C06821
	(delete when cer fltr is used (FL2))	
C20	Cap, mica, 10pF, 5%, 500 Vdcw	C05100
	(delete when cer fltr is used (FL2))	
C21	Cap, mica, 820pF, 5%, 500 Vdcw	C06821
	(delete when cer fltr is used (FL2))	
C22	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C23	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C24	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C25	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C26	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C27	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C28	Cap, tant, 22μF, 10%, 15 Vdcw	C42263
C29	Cap, cer, 0.1μF, +80-20%, 25 Vdcw	C11000

IF/AUDIO PC BD ASSY (CONT.)

REF DESIG	DESCRIPTION	P/N
C30	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C31	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C32	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C33	Cap, tant, 22μF, 10%, 15 Vdcw	C42263
C34	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C35	Cap, cer, 0.1μF, +80-20%, 25 Vdcw	C11000
C36	Cap, tant, 22μF, 10%, 15 Vdcw	C42263
C37	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C38	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C39	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C40	Cap, mica, 1000pF, 5%, 500 Vdcw	C06102
C41	Cap, tant, 22μF, 10%, 15 Vdcw	C42263
C42	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C43	Cap, tant, 10μF, 10%, 20 Vdcw	C41064
C44	Cap, cer, 0.1μF, +80-20%, 25 Vdcw	C11000
C45	Cap, cer, 0.1μF, +80-20%, 25 Vdcw	C11000
C46	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C47	Cap, mica, 1000pF, 5%, 500 Vdcw	C06102
C48	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C49	Cap, cer, 0.1μF, +80-20%, 25 Vdcw	C11000
C50	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C51	Cap, cer, 0.1μF, +80-20%, 25 Vdcw	C11000
C52	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C53	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C54	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C55	Cap, mica, 1000pF, 5%, 500 Vdcw	C06102
C56	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C57	Cap, cer, 0.1μF, +80-20%, 25 Vdcw	C11000
C58	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C59	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C60	Cap, mica, 1000pF, 5%, 500 Vdcw	C06102
C61	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C62	Cap, tant, 10μF, 10%, 20 Vdcw	C41064
C63	Cap, cer, 0.1μF, +80-20%, 25 Vdcw	C11000
C64	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C65	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C66	Cap, cer, 0.1μF, +80-20%, 25 Vdcw	C11000
C67	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C68	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C69	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C70	Cap, cer, 0.1μF, +80-20%, 25 Vdcw	C11000
C71	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C72	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C73	Cap, tant, 10μF, 10%, 20 Vdcw	C41064
C74	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C75	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056

IF/AUDIO PC BD ASSY (CONT.)

REF DESIG	DESCRIPTION	P/N
C76	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C77	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C78	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C79	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C80	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C81	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C82	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C83	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C84	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C85	Cap, mica, ___pF, 5%, 500 Vdcw	
	(for 1.4 MHz IF: 820pF)	C06821
	(for 1.5 MHz IF: 680pF)	C06681
C86	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C87	Cap, mica, 82pF, 5%, 500 Vdcw	C05820
C88	Cap, cer, 0.1μF, +80-20%, 25 Vdcw	C11000
CR1	Diode, si, signal, 1N4148	CR4148
CR2	Diode, si, signal, 1N4148	CR4148
CR3	Diode, si, signal, 1N4148	CR4148
CR4	Diode, si, signal, 1N4148	CR4148
CR5-CR6	Not used	---
CR7	Diode, si, signal, 1N4148	CR4148
CR8	Diode, si, signal, 1N4148	CR4148
CR9	Diode, si, signal, 1N4148	CR4148
CR10	Diode, si, signal, 1N4148	CR4148
CR11	Diode, si, signal, 1N4148	CR4148
CR12	Not used	---
CR13	Diode, si, signal, 1N4148	CR4148
CR14	Diode, si, signal, 1N4148	CR4148
CR15	Diode, si, signal, 1N4148	CR4148
CR16	Diode, si, signal, 1N4148	CR4148
CR17	Diode, si, signal, 1N4148	CR4148
CR18	Diode, si, signal, 1N4148	CR4148
CR19	Diode, si, signal, 1N4148	CR4148
CR20	Diode, si, signal, 1N4148	CR4148
CR21	Diode, si, signal, 1N4148	CR4148
CR22	Diode, si, signal, 1N4148	CR4148
CR23	Diode, si, signal, 1N4148	CR4148
CR24	Diode, si, signal, 1N4148	CR4148
CR25	Diode, si, signal, 1N4148	CR4148
CR26	Diode, si, signal, 1N4148	CR4148
CR27	Diode, si, signal, 1N4148	CR4148
CR28	Diode, si, signal, 1N4148	CR4148
CR29	Diode, si, signal, 1N4148	CR4148
CR30	Diode, si, signal, 1N4148	CR4148
CR31	Diode, si, signal, 1N4148	CR4148
CR32	Diode, si, signal, 1N4148	CR4148

IF/AUDIO PC BD ASSY (CONT.)

REF DESIG	DESCRIPTION	P/N
CR33	Diode, si, signal, 1N4148	CR4148
CR34	Diode, si, signal, 1N4148	CR4148
FL1	Filter, mechanical, as listed below:	
	3 kHz, ssb	FL1002
	2.1 kHz, usb	FL1007
FL2	Filter, mechanical, as listed below:	
	8 kHz, am (option item)	FL1003
	6 kHz, am (option item)	FL1008
L1	Choke, rf, 51μH	L10510
L2	Choke, rf, 51μH	L10510
L3	Choke, rf, 750μH	L10751
L4	Choke, rf, 750μH	L10751
L5	Choke, rf, 51μH	L10510
L6	Not used	---
L7	Choke, rf, 750μH	L10751
L8	Choke, rf, 750μH	L10751
L9	Choke, rf, 750μH	L10751
L10	Choke, rf, 750μH	L10751
L11	Choke, rf, 390μH (use only with cer fltr (FL2))	L10391
L12	Choke, rf, 330μH (use only with cer fltr (FL2))	L10331
Q1	Transistor, npn, 2N4123	Q41230
Q2	Transistor, npn, 2N5179	Q51790
Q3	Transistor, npn, 2N4123	Q41230
Q4	Transistor, npn, 2N4123	Q41230
Q5	Transistor, npn, 2N4123	Q41230
Q6	Transistor, npn, 2N4123	Q41230
Q7	Transistor, npn, 2N4123	Q41230
Q8	Transistor, pnp, 50V, 2N5086	Q50860
Q9	Transistor, npn, 2N4123	Q41230
Q10	Transistor, npn, 2N4123	Q41230
Q11	Transistor, npn, 2N4123	Q41230
Q12	Transistor, pnp, 2N4125	Q41250
Q13	Transistor, npn, 2N4123	Q41230
Q14	Transistor, npn, 2N4123	Q41230
Q15	Transistor, npn, 2N4123	Q41230
Q16	Transistor, npn, 2N4123	Q41230
Q17	Transistor, npn, 2N4123	Q41230
Q18	Transistor, npn, 2N4123	Q41230
Q19	Transistor, npn, 2N4123	Q41230
Q20	Transistor, npn, 2N4123	Q41230
Q21	Transistor, pnp, 2N4125	Q41250
Q22	Transistor, npn, 2N4123	Q41230

IF/AUDIO PC BD ASSY (CONT.)

REF DESIG	DESCRIPTION	P/N
Q23	Transistor, pnp, 2N4125	Q41250
Q24	Transistor, pnp, 2N4125	Q41250
Q25	Transistor, pnp, 2N4125	Q41250
Q26	Transistor, npn, 2N4123	Q41230
Q27	Transistor, npn, 2N4400	Q44000
Q28	Transistor, npn, 2N4123	Q41230
Q29	Transistor, npn, 2N4123	Q41230
Q30	Transistor, npn, 2N4123	Q41230
R1	Res, comp, 2.2K, 5%, 1/4W	R20222
R2	Res, comp, 100Ω, 5%, 1/4W	R20101
R3	Pot, trim, pc, 100Ω	R88101
R4	Res, comp, 10K, 5%, 1/4W	R20103
R5	Res, comp, 1.5K, 5%, 1/4W	R20152
R6	Res, comp, 100Ω, 5%, 1/4W	R20101
R7	Res, comp, 100Ω, 5%, 1/4W	R20101
R8	Res, comp, 1.8K, 5%, 1/4W	R20182
R9	Res, comp, 10K, 5%, 1/4W	R20103
R10	Res, comp, 4.7K, 5%, 1/4W	R20472
R11	Res, comp, 10K, 5%, 1/4W	R20103
R12	Res, comp, 47K, 5%, 1/4W	R20473
R13	Res, comp, 47K, 5%, 1/4W	R20473
R14	Res, comp, 4.7K, 5%, 1/4W	R20472
R15	Res, comp, 10Ω, 5%, 1/4W	R20100
R16	Res, comp, 10K, 5%, 1/4W	R20103
R17	Res, comp, 33K, 5%, 1/4W	R20333
R18	Res, comp, 10K, 5%, 1/4W	R20103
R19	Res, comp, 3.3K, 5%, 1/4W	R20332
R20	Res, comp, 47K, 5%, 1/4W (delete when FL2 is a cer fltr)	R20473
R21	Res, comp, 47K, 5%, 1/4W (delete when FL2 is a cer fltr)	R20473
R22	Res, comp, 100Ω, 5%, 1/4W	R20101
R23	Res, comp, 47K, 5%, 1/4W	R20473
R24	Res, comp, 47K, 5%, 1/4W	R20473
R25	Res, comp, 4.7K, 5%, 1/4W	R20472
R26	Pot, trim, pc, 10K	R88103
R27	Res, comp, 2.7K, 5%, 1/4W	R20272
R28	Res, comp, 1K, 5%, 1/4W	R20102
R29	Not used	---
R30	Res, comp, 4.7K, 5%, 1/4W	R20472
R31	Res, comp, 82Ω, 5%, 1/4W	R20820
R32	Pot, trim, pc, 100Ω	R88101
R33	Not used	---
R34	Res, comp, 100Ω, 5%, 1/4W	R20101
R35	Pot, trim, pc, min, 10K	R89103
R36	Res, comp, 3.3K, 5%, 1/4W	R20332

IF/AUDIO PC BD ASSY (CONT.)

REF DESIG	DESCRIPTION	P/N
R37	Res, comp, 27Ω, 5%, 1/4W	R20270
R38	Res, comp, 56Ω, 5%, 1/4W	R20560
R39	Res, comp, 10Ω, 5%, 1/4W	R20100
R40	Res, comp, 1K, 5%, 1/4W	R20102
R41	Res, comp, 4.7K, 5%, 1/4W	R20472
R42	Res, comp, 100K, 5%, 1/4W	R20104
R43	Res, comp, 2.7K, 5%, 1/4W	R20272
R44	Res, comp, 1K, 5%, 1/4W	R20102
R45	Res, comp, 4.7K, 5%, 1/4W	R20472
R46	Res, comp, 8.2K, 5%, 1/4W	R20822
R47	Res, comp, 560Ω, 5%, 1/4W	R20561
R48	Res, comp, 4.7K, 5%, 1/4W	R20472
R49	Res, comp, 470Ω, 5%, 1/4W	R20471
R50	Res, comp, 1K, 5%, 1/4W	R20102
R51	Res, comp, 2.7K, 5%, 1/4W	R20272
R52	Res, comp, 82Ω, 5%, 1/4W	R20820
R53	Res, comp, 2.7K, 5%, 1/4W	R20272
R54	Res, comp, 27Ω, 5%, 1/4W	R20270
R55	Pot, trim, pc, min, 5K	R89502
R56	Res, comp, 2.2K, 5%, 1/4W	R20222
R57	Res, comp, 10K, 5%, 1/4W	R20103
R58	Res, comp, 470K, 5%, 1/4W	R20474
R59	Res, comp, 47K, 5%, 1/4W	R20473
R60	Res, comp, 10K, 5%, 1/4W	R20103
R61	Res, comp, 15K, 5%, 1/4W	R20153
R62	Res, comp, 2.2K, 5%, 1/4W	R20222
R63	Res, comp, 220K, 5%, 1/4W	R20224
R64	Pot, trim, pc, 5K	R88502
R65	Res, comp, 560Ω, 5%, 1/4W	R20561
R66	Not used	---
R67	Res, comp, 10K, 5%, 1/4W	R20103
R68	Res, comp, 8.2K, 5%, 1/4W	R20822
R69	Res, comp, 2.7K, 5%, 1/4W	R20272
R70	Res, comp, 4.7K, 5%, 1/4W	R20472
R71	Res, comp, 1K, 5%, 1/4W	R20102
R72	Res, comp, 1.8K, 5%, 1/4W	R20182
R73	Res, comp, 6.8K, 5%, 1/4W	R20682
R74	Res, comp, 560Ω, 5%, 1/4W	R20561
R75	Res, comp, 120K, 5%, 1/4W	R20124
R76	Res, comp, 4.7K, 5%, 1/4W	R20472
R77	Res, comp, 6.8K, 5%, 1/4W	R20682
R78	Res, comp, 1.2K, 5%, 1/4W	R20122
R79	Res, comp, 560Ω, 5%, 1/4W	R20561
R80	Res, comp, 220Ω, 5%, 1/4W	R20221
R81	Res, comp, 150Ω, 5%, 1/4W	R20151
R82	Res, comp, 1K, 5%, 1/4W	R20102
R83	Res, comp, 27Ω, 5%, 1/4W	R20270

IF/AUDIO PC BD ASSY (CONT.)

REF DESIG	DESCRIPTION	P/N
R84	Res, comp, 4.7K, 5%, 1/4W	R20472
R85	Res, comp, 1K, 5%, 1/4W	R20102
R86	Res, comp, 1K, 5%, 1/4W	R20102
R87	Not used	---
R88	Res, comp, 10Ω, 5%, 1/4W	R20100
R89	Res, comp, 470Ω, 5%, 1/4W	R20471
R90	Res, comp, 2.2K, 5%, 1/4W	R20222
R91	Res, comp, 3.3K, 5%, 1/4W	R20332
R92	Res, comp, 6.8K, 5%, 1/4W	R20682
R93	Not used	---
R94	Res, comp, 1.8K, 5%, 1/4W	R20182
R95	Res, comp, 470Ω, 5%, 1/4W	R20471
R96	Res, comp, 1K, 5%, 1/4W	R20102
R97	Res, comp, 10Ω, 5%, 1/4W	R20100
R98	Res, comp, 2.2K, 5%, 1/4W	R20222
R99	Res, comp, 10Ω, 5%, 1/4W	R20100
R100	Res, comp, 560Ω, 5%, 1/4W	R20561
R101	Res, comp, 1K, 5%, 1/4W	R20102
R102	Res, comp, 4.7K, 5%, 1/4W	R20472
R103	Res, comp, 1K, 5%, 1/4W	R20102
R104	Res, comp, 27Ω, 5%, 1/4W	R20270
R105	Pot, trim, pc, 100Ω	R88101
R106	Res, comp, 1K, 5%, 1/4W	R20102
R107	Res, comp, 1K, 5%, 1/4W	R20102
R108	Res, comp, 1.5K, 5%, 1/4W	R20152
R109	Res, comp, 5.6K, 5%, 1/4W	R20562
R110	Res, comp, 1K, 5%, 1/4W	R20102
R111	Res, comp, 18K, 5%, 1/4W	R20183
R112	Res, comp, 18K, 5%, 1/4W	R20183
R113	Res, comp, 6.8K, 5%, 1/4W	R20682
R114	Res, comp, 6.8K, 5%, 1/4W	R20682
R115	Not used	---
R116	Res, comp, 4.7K, 5%, 1/4W	R20472
R117	Res, comp, 22K, 5%, 1/4W	R20223
R118	Res, comp, 6.8K, 5%, 1/4W	R20682
R119	Res, comp, 5.6K, 5%, 1/4W	R20562
R120	Res, comp, 4.7K, 5%, 1/4W	R20472
R121	Res, comp, 1.8K, 5%, 1/4W	R20182
R122	Res, comp, 1K, 5%, 1/4W	R20102
R123	Res, comp, 47K, 5%, 1/4W	R20473
R124	Pot, trim, pc, min, 5K	R89502
R125	Res, comp, 220Ω, 5%, 1/4W	R20221
R126	Res, comp, 4.7K, 5%, 1/4W	R20472
R127	Pot, trim, pc, min, 5K	R89502
R128	Res, comp, 2.7K, 5%, 1/4W	R20272
R129	Res, comp, 2.2K, 5%, 1/4W	R20222
R130	Not used	---

IF/AUDIO PC BD ASSY (CONT.)

REF DESIG	DESCRIPTION	P/N
R131	Not used	---
R132	Res, comp, 100K, 5%, 1/4W	R20104
R133	Res, comp, 10Ω, 5%, 1/4W	R20100
R134	Res, comp, 100Ω, 5%, 1/4W	R20101
T1	Transformer, if, 1500 kHz	T10006
T2	Transformer, 2-30 MHz, broadband	T10200
T3	Transformer, if, 1500 kHz	T10004
T4	Transformer, if, 455 kHz	T10002
T5	Transformer, if, 455 kHz	T10002
T6	Transformer, if, 455 kHz	T10002
T7	Transformer, if, 455 kHz	T10003
T8	Transformer, if, 455 kHz (delete when FL2 is a ceramic fltr)	T10002
T9	Transformer, if, 455 kHz (delete when FL2 is a ceramic fltr)	T10002
U1	IC, rf ampl, CA-3028A	U3028A
U2	IC, rf ampl, CA-3028A	U3028A
U3	IC, rf ampl, CA-3028A	U3028A
U4	IC, rf ampl, CA-3028A	U3028A
U5	IC, modulator, MC1596G	U1596G
VR1	Diode, zener, 6.8V, 5%, 400 mW, 1N754A	VR7540
VR2	Diode, zener, 5.6V, 5%, 400 mW, 1N752A	VR7520

TABLE 10-2. RECEIVE PATH VOLTAGE INDICATIONS

Test Conditions unless otherwise noted:

a. 100 MV receive signal at antenna jack.

b. USB mode.

c. Function switch set to RECEIVE.

d. Measurements indicated are typical, but actual units may vary widely.

TEST POINT LOCATION	SPECIAL CONDITIONS	INDICATION (Referenced to ground)
Q5 and Q3 bases	AM	0.7 Vdc (Base of Q5 and Q3 forward biased)
	SSB	0 Vdc (Q5 and Q3 off)
Q4 and Q6 bases	AM	0 Vdc (Q4 and Q6 off)
	SSB	0.7 Vdc (Bases of Q4 and Q6 forward biased)
U1 pins 1 and 5		7.6 Vdc
U1 pin 8		12 Vdc
U2 pins 1 and 5		7.8 Vdc
U2 pin 6		12 Vdc

TEST POINT LOCATION	SPECIAL CONDITIONS	INDICATION (Referenced to ground)
U3 pin 1	SSB or AM SSB only	7 Vdc 0.1 Vac at 455 kHz
U3 pin 5		7 Vdc
U3 pin 6		7.8 Vdc
Q18 emitter		6.6 Vdc 0.5 Vac at audio frequency
Q20 base		1.75 Vdc
Q22 emitter		7.3 Vdc 2.2 Vac at audio frequency

TABLE 10-3. AGC CIRCUIT VOLTAGE INDICATIONS

Transceiver set for RECEIVE.

TEST POINT LOCATION	SPECIAL CONDITIONS	INDICATIONS (Referenced to ground)
Q9 collector	0 input signal	3.9 Vdc
Q10 Base	100 MV input signal	1.4 Vdc
Q12 Base	100 MV input signal	4.2 Vdc
Q30 Base	100 MV input signal	1.65 Vac at 455 kHz
U4 pin 6 and 8	0 input signal 100 MV input signal	12.2 Vdc 4.8 Vac at 455 kHz
U4 pin 7	0 input signal	5.9 Vdc
R127 wiper contact (near U3)	100 MV input signal	17 MV ac at 455 kHz 7.4 Vdc
Junction of C27 and R74 (near Q8)	0 signal 100 MV input	-1.1V -18.5 Vdc

TABLE 10-4. INJECTION AND CONTROL VOLTAGE INDICATIONS

TEST POINT LOCATION	SPECIAL CONDITIONS	INDICATIONS (Referenced to ground)
Q2 Base	SSB, TX OR RX	1.5 Vdc 200 Mv ac at 1.9 MHz
Q2 collector	SSB, TX OR RX	3.7 Vac at 1.9 MHz
Junction R7 and R4 (near Q2)	SSB, TX OR RX	11.5 Vdc
Q16 emitter	TX	1.3 Vdc
Q14 emitter	RX TX	1.0 Vdc 0 Vdc
Q15 emitter	AM TX	1.4 Vdc

TABLE 10-5. KEYING CIRCUIT INDICATIONS

TEST POINT LOCATION	SPECIAL CONDITIONS	INDICATIONS (Referenced to ground)
Q24 Base	AM TUNE	12 Vdc (Q24 saturated)
Q25 emitter	Not keyed Keyed	7 Vdc 2 Vdc
Q26 collector	Not keyed Keyed	0 Vdc (Q26 saturated) 5 Vdc (Q26 off)
Q27 collector	Not keyed Keyed	12.5 Vdc (Q27 off) 0.2 Vdc (Q27 saturated)

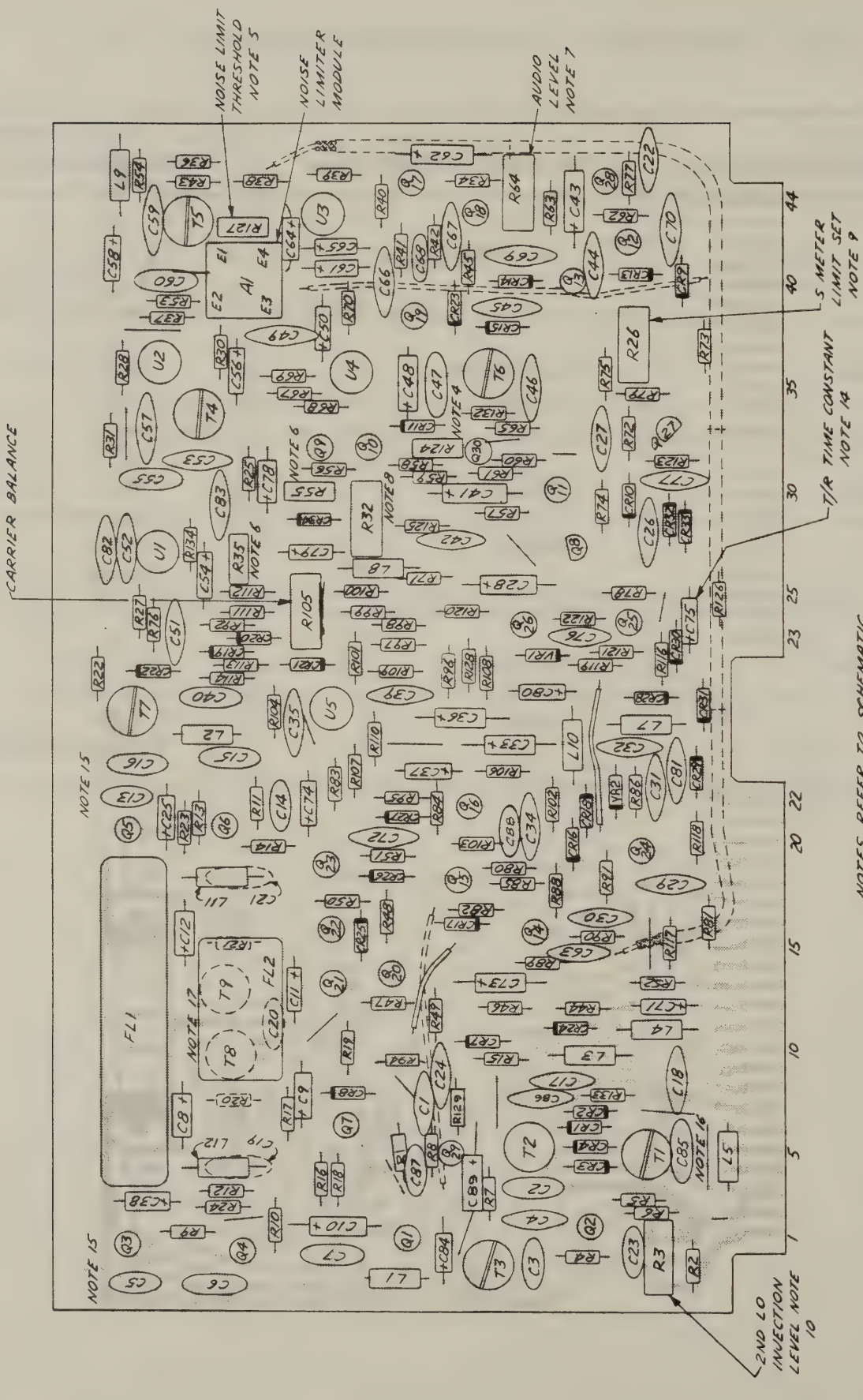
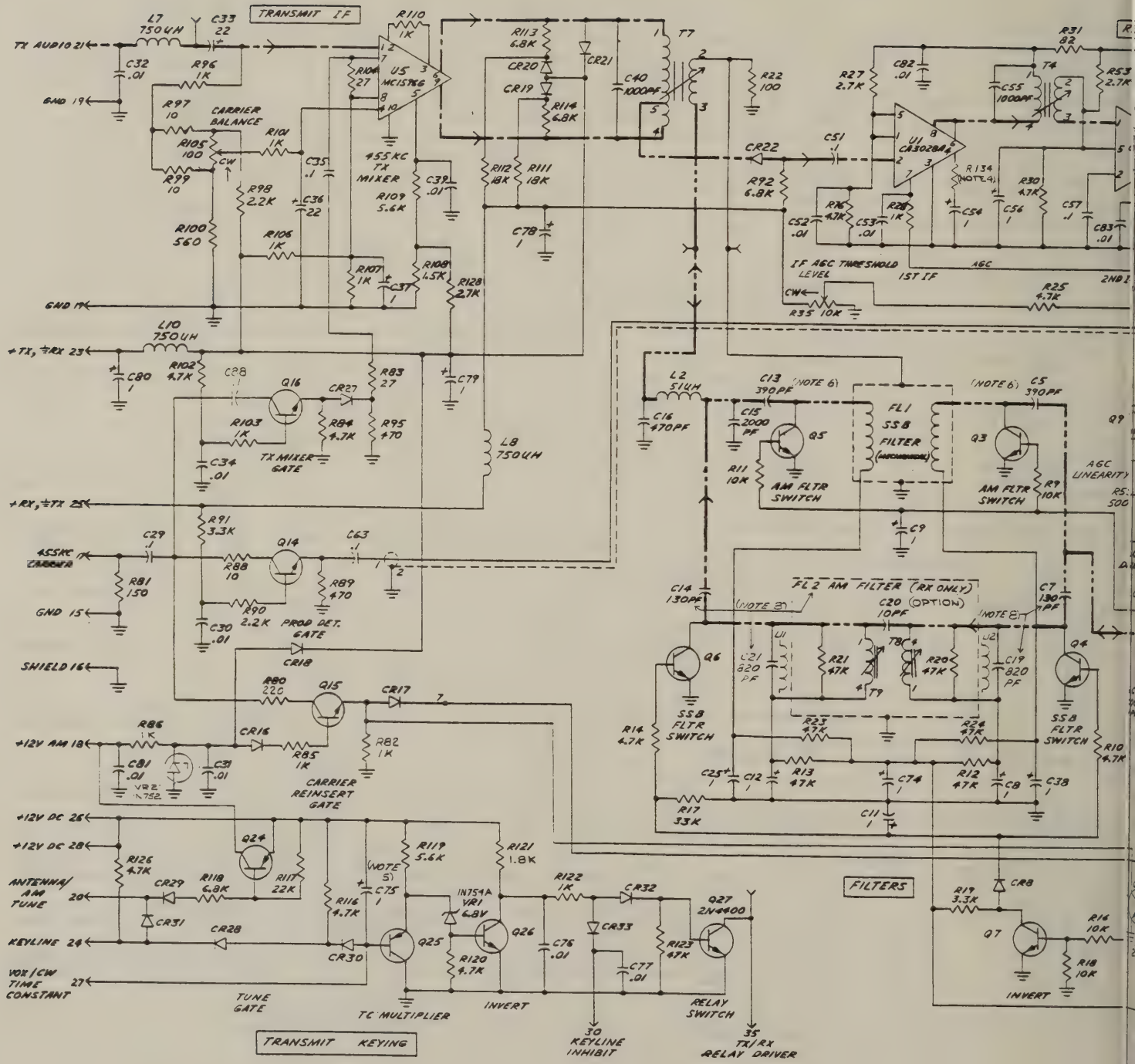
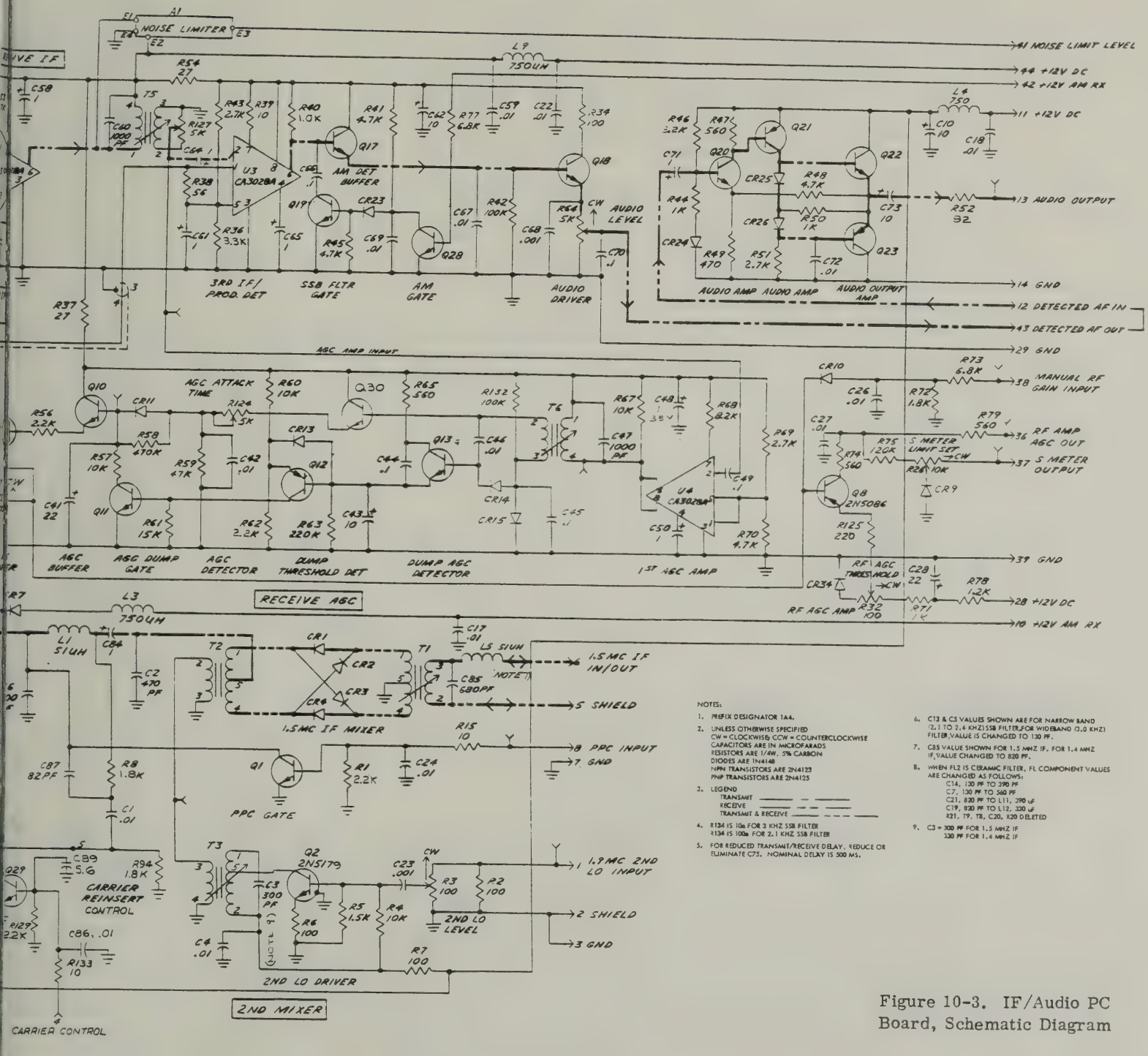


Figure 10-2. IF/Audio PC Board Assembly

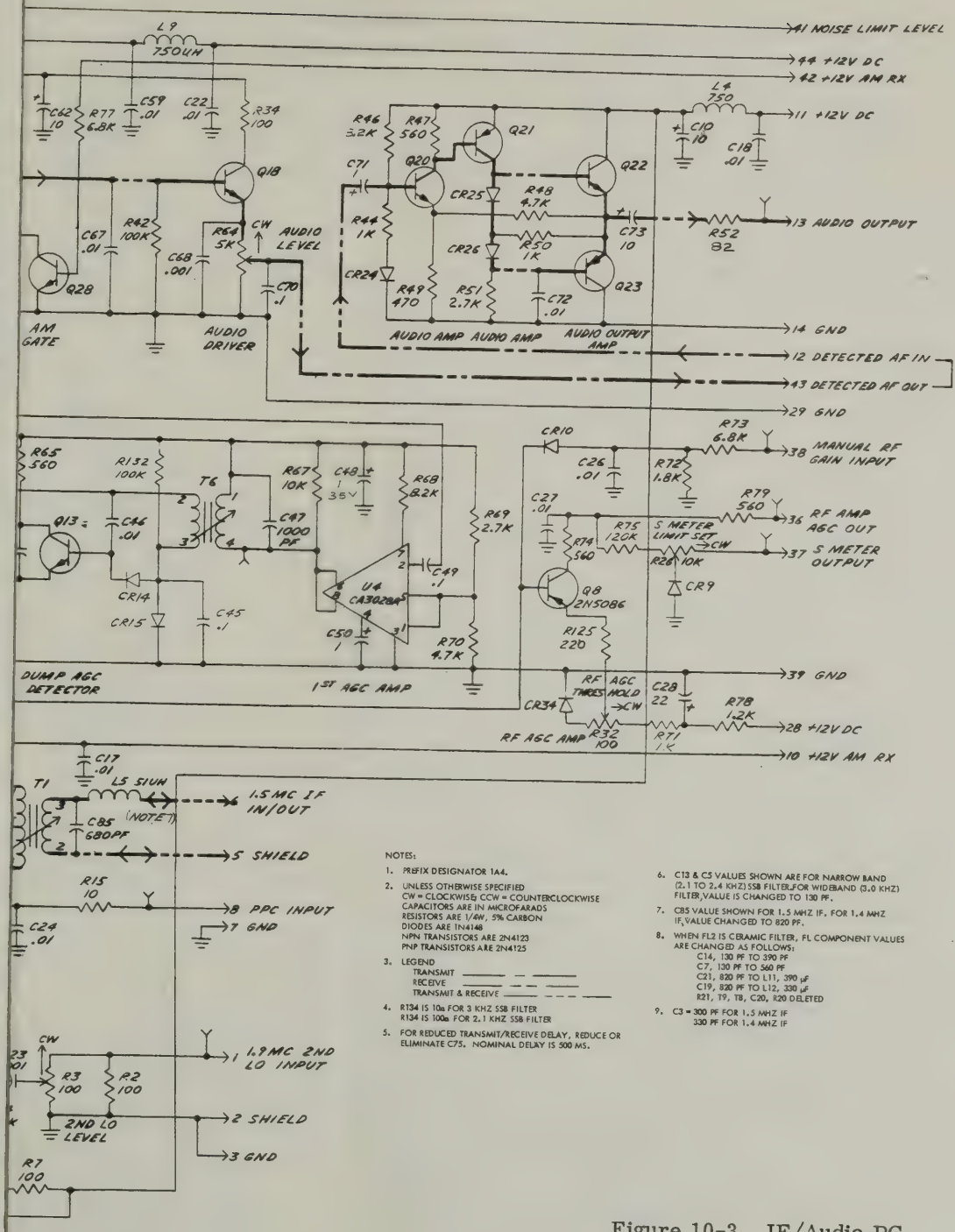

TRANSMIT IF
TX AUDIO 21
GND 19
GND 17
+TX, -RX 23
+RX, -TX 25
455KC CARRIER
SHIELD 16
+12V AM 18
+12V DC 26
+12V DC 28
ANTENNA/ AM TUNE 20
KEYLINE 24
VOX/CW TIME CONSTANT 27
CARRIER BALANCE
455 KC TX MIXER
TX MIXER GATE
PROD DET. GATE
CARRIER REINSERT GATE
TUNE GATE
TC MULTIPLIER
INVERT
RELAY SWITCH
TRANSMIT KEYING
30 KEYLINE INHIBIT
35 TX/RX RELAY DRIVER
IF AGC THRESHOLD LEVEL
1ST IF
AGC
2ND I
FL1 SSB FILTER
FL2 AM FILTER (RX ONLY)
AM FLTR SWITCH
SSB FLTR SWITCH
AGC LINEARITY
FILTERS
INVERT



NOTES:

1. PREFIX DESIGNATOR 1A4.
2. UNLESS OTHERWISE SPECIFIED
   CW = CLOCKWISE& CCW = COUNTERCLOCKWISE
   CAPACITORS ARE IN MICROFARADS
   RESISTORS ARE 1/4W, 5% CARBON
   DIODES ARE 1N4148
   NPN TRANSISTORS ARE 2N4123
   PNP TRANSISTORS ARE 2N4125
3. LEGEND
   TRANSMIT
   RECEIVE
   TRANSMIT & RECEIVE
4. R134 IS 10Ω FOR 3 KHZ SSB FILTER
   R134 IS 100Ω FOR 2.1 KHZ SSB FILTER
5. FOR REDUCED TRANSMIT/RECEIVE DELAY, REDUCE OR ELIMINATE C75. NOMINAL DELAY IS 500 MS.
6. C13 & C5 VALUES SHOWN ARE FOR NARROW BAND (2.1 TO 2.4 KHZ) SSB FILTER,FOR WIDEBAND (3.0 KHZ) FILTER,VALUE IS CHANGED TO 130 PF.
7. C85 VALUE SHOWN FOR 1.5 MHZ IF. FOR 1.4 MHZ IF,VALUE CHANGED TO 820 PF.
8. WHEN FL2 IS CERAMIC FILTER, FL COMPONENT VALUES ARE CHANGED AS FOLLOWS:
   C14, 130 PF TO 390 PF
   C7, 130 PF TO 560 PF
   C21, 820 PF TO L11, 390 uF
   C19, 820 PF TO L12, 330 uF
   R21, T9, T8, C20, R20 DELETED
9. C3 = 300 PF FOR 1.5 MHZ IF
   330 PF FOR 1.4 MHZ IF

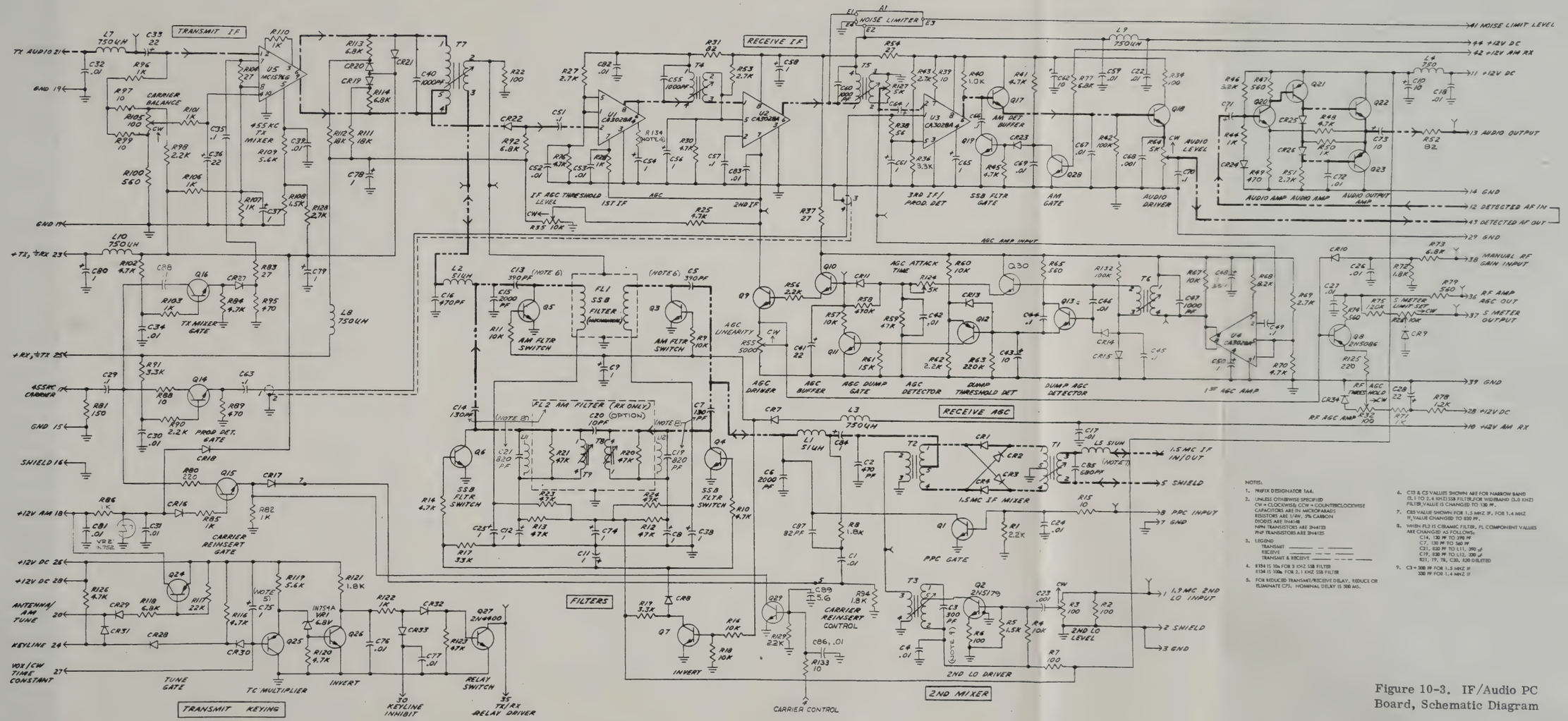
Figure 10-3. IF/Audio PC Board, Schematic Diagram



NOTES:

1. PREFIX DESIGNATOR 1A4.
2. UNLESS OTHERWISE SPECIFIED
   CW = CLOCKWISE; CCW = COUNTERCLOCKWISE
   CAPACITORS ARE IN MICROFARADS
   RESISTORS ARE 1/4W, 5% CARBON
   DIODES ARE 1N4148
   NPN TRANSISTORS ARE 2N4123
   PNP TRANSISTORS ARE 2N4125
3. LEGEND
   TRANSMIT ——— — ———
   RECEIVE ——— — — ———
   TRANSMIT & RECEIVE ——— — — — ———
4. R134 IS 10Ω FOR 3 KHZ SSB FILTER
   R134 IS 100Ω FOR 2.1 KHZ SSB FILTER
5. FOR REDUCED TRANSMIT/RECEIVE DELAY, REDUCE OR ELIMINATE C75. NOMINAL DELAY IS 500 MS.
6. C12 & C5 VALUES SHOWN ARE FOR NARROW BAND (2.1 TO 2.4 KHZ) SSB FILTER. FOR WIDEBAND (3.0 KHZ) FILTER, VALUE IS CHANGED TO 130 PF.
7. CB5 VALUE SHOWN FOR 1.5 MHZ IF. FOR 1.4 MHZ IF, VALUE CHANGED TO 820 PF.
8. WHEN FL2 IS CERAMIC FILTER, FL COMPONENT VALUES ARE CHANGED AS FOLLOWS:
   C14, 130 PF TO 390 PF
   C7, 130 PF TO 560 PF
   C21, 820 PF TO L11, 390 μF
   C19, 820 PF TO L12, 330 μF
   R21, T9, T8, C20, R20 DELETED
9. C3 = 300 PF FOR 1.5 MHZ IF
   330 PF FOR 1.4 MHZ IF

Figure 10-3. IF/Audio PC Board, Schematic Diagram



NOTES:

1. PREFIX DESIGNATOR 1A4.
2. UNLESS OTHERWISE SPECIFIED
   CW = CLOCKWISE; CCW = COUNTERCLOCKWISE
   CAPACITORS ARE IN MICROFARADS
   RESISTORS ARE 1/4W, 5% CARBON
   DIODES ARE 1N4148
   NPN TRANSISTORS ARE 2N4123
   PNP TRANSISTORS ARE 2N4125
3. LEGEND
   TRANSMIT ——————
   RECEIVE — — — —
   TRANSMIT & RECEIVE — · — · —
4. R134 IS 10Ω FOR 3 KHZ SSB FILTER
   R134 IS 100Ω FOR 2.1 KHZ SSB FILTER
5. FOR REDUCED TRANSMIT/RECEIVE DELAY, REDUCE OR ELIMINATE C75. NOMINAL DELAY IS 300 MS.
6. C13 & C5 VALUES SHOWN ARE FOR NARROW BAND (2.1 TO 2.4 KHZ) SSB FILTER. FOR WIDEBAND (3.0 KHZ) FILTER, VALUE IS CHANGED TO 130 PF.
7. C85 VALUE SHOWN FOR 1.5 MHZ IF. FOR 1.4 MHZ IF, VALUE CHANGED TO 820 PF.
8. WHEN FL2 IS CERAMIC FILTER, FL COMPONENT VALUES ARE CHANGED AS FOLLOWS:
   C14, 130 PF TO 390 PF
   C7, 130 PF TO 560 PF
   C21, 820 PF TO L11, 390 μH
   C19, 820 PF TO L12, 330 μH
   R21, 19, 18, C20, 820 Ω DELETED
9. C3 = 300 PF FOR 1.5 MHZ IF
   330 PF FOR 1.4 MHZ IF

Figure 10-3. IF/Audio PC Board, Schematic Diagram

CHAPTER 11
AC POWER SUPPLY ASSY A5

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11.1 GENERAL.

There are four basic power supplies for the Transceiver: 115/230 Vac sine wave, 115 Vac sine/square wave, 13.2 Vdc, and 26.4 Vdc. They are interchangeable, with a plug in, screw mount arrangement. The ac supplies have a 115/230 Vac or SINE/SQUARE selector switch, which is accessable when a rear panel hole plug is removed. The ac power supplies are covered in this chapter, and the dc power supplies are covered in Chapter 12.

11.2 THEORY OF OPERATION.

The AC Power Supply consists of power transformer T1, which supplies 12.6 Vac for tube heaters and ovens, 24 Vac for the remote control motor and antenna coupler or linear power amplifier channel motors, and all voltages required for the rectifiers of the Regulator and Filter Board Assembly A5A1. Refer to schematic diagram Figure 11-3. Line switch S2 is used to connect the double primaries of T1 either in parallel for 117 Vac operation, or in series for 234 Vac operation; or in the case of sine/square operation (Figure 11-4), it switches taps on the primary and secondary. If the nominal line voltage is either 10% high or low, reconnect the taps as shown on the schematic.

The Regulator Board contains four rectifier circuits and a regulator. Diodes CR1 through CR8 comprise the rectifier for the +750 Vdc power amplifier plate voltage. Diodes CR9 through CR12 provide the +240 Vdc for the driver plate supply and power amplifier screen supply. It should be noted that the 250μF filter capacitor A3C13 for this supply is housed in the RF Amplifier chassis. Diode CR13 is the rectifier for the -140 Vdc supply.

Diodes CR14 and CR15 provide unregulated dc for the series regulator circuit. The regulator consists of series pass transistor Q1, mounted on the chassis, and differential amplifier and driver transistors Q1 through Q4 on Regulator Board A5A1. Potentiometer R15 is used to adjust the output of the regulator to +12.6 Vdc.

In the standby mode of operation, a ground level is applied on pin 4 of the regulator/filter board. A ground on this line shunts base drive from transistor Q1 through diode CR16. With base drive removed from driver transistor Q1, the regulator is turned off; and voltage is removed from the 12.6 Vdc regulated supply output.

11.3 LINE VOLTAGE JUMPER WIRING.

The ac power supplies have transformer primary taps to allow rewiring for high or low line voltage. (Refer to appropriate schematic diagram for connection details.) If it is suspected that line voltage is high or low from nominal, the line voltage should be checked under normal load. If it is necessary, rewire input leads only to different transformer taps as indicated in the schematic diagrams. Do not reconnect the blower motor output lead to a different tap, as it should remain connected to the 115 Vac tap as shown.

REF DESIG	DESCRIPTION	P/N
---	POWER SUPPLY MODULE (115/230 Vac)	200400
	(Sine/Square)	210400
A1	Regulator PC Board Assembly	200440
A2	Filter PC Board Assembly	210402
C1	Cap, cer, .0047μF, 10%, 500 Vdcw	C10047
C2	Cap, cer, .0047μF, 10%, 500 Vdcw	C10047
F2	Fuse, 3AG, slo-blo, 0.25 Amp	F20025
F3	Fuse, 3AG, slo-blo, 5 Amp	F20500
	(with Remote, 10 Amp)	(F21000)
F4	Fuse, slo-blo, 10 Amp	F21000
F5	Fuse, 3AG, slo-blo, 2 Amp	F20200
F6	Fuse, as listed below:	
	115 Vac: Fuse, 3AB, 15 Amp	F11500
	230 Vac: Fuse, 3AG, fast-blo, 5 Amp	F10500
J1	Recept, ac power	J00203
J2	Socket, octal type, 8 pins	X00701
J3	Recept, 2 socket, in-line	J00202
Q1	Transistor, npn, power, MJE-3055	Q00001
S1	Switch, slide, 3 pdt, slot (Sine/Square only)	S00203
	OR Switch, slide, dpdt, 115/230 Vac	S00200
T1	Transformer, main power (115/230 Vac)	T00100
	OR Transformer, main power, sine/square, 115 Vac	T00104
XF2	Fuseholder, standard	X00400
XF3	Fuseholder, standard	X00400
XF4	Fuseholder, standard	X00400
XF5	Fuseholder, standard	X00400

REGULATOR FILTER PC BD ASSY A1

REF DESIG	DESCRIPTION	P/N
---	REGULATOR FILTER PC BOARD ASSEMBLY	200440
C1	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C2	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C3	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C4	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C5	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C6	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C7	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C8	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C9-C11	Not used	---
C12	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C13	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C14	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C15	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
C16	Not used	---
C17	Cap, elect, 500μF, 50 Vdcw	C70003
C18	Cap, tant, 5.6μF, 10%, 35 Vdcw	C45656
C19	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C20	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C21	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
CR1	Diode, si, 1 Amp, 1 kV, 1N4007	CR4007
CR2	Diode, si, 1 Amp, 1 kV, 1N4007	CR4007
CR3	Diode, si, 1 Amp, 1 kV, 1N4007	CR4007
CR4	Diode, si, 1 Amp, 1 kV, 1N4007	CR4007
CR5	Diode, si, 1 Amp, 1 kV, 1N4007	CR4007
CR6	Diode, si, 1 Amp, 1 kV, 1N4007	CR4007
CR7	Diode, si, 1 Amp, 1 kV, 1N4007	CR4007
CR8	Diode, si, 1 Amp, 1 kV, 1N4007	CR4007
CR9	Diode, si, 1 Amp, 1 kV, 1N4007	CR4007
CR10	Diode, si, 1 Amp, 1 kV, 1N4007	CR4007
CR11	Diode, si, 1 Amp, 1 kV, 1N4007	CR4007
CR12	Diode, si, 1 Amp, 1 kV, 1N4007	CR4007
CR13	Diode, si, 1 Amp, 1 kV, 1N4007	CR4007
CR14	Diode, si, 3 Amp, 100V, 3AF1	CR3AF1
CR15	Diode, si, 3 Amp, 100V, 3AF1	CR3AF1
CR16	Diode, si, signal, 1N4148	CR4148
CR17	Diode, si, signal, 1N4148	CR4148
CR18	Diode, si, signal, 1N4148	CR4148
FL1	Ferrite bead	FL0004
L1	Choke, rf, 1 mH	L10102
Q1	Transistor, npn, 2N1613	Q16130
Q2	Transistor, npn, 2N4400	Q44000

REGULATOR FILTER PC BD ASSY A1 (CONT.)

REF DESIG	DESCRIPTION	P/N
Q3	Transistor, npn, 2N4123	Q41230
Q4	Transistor, npn, 2N4123	Q41230
R1-R3	Not used	---
R4	Res, comp, 47K, 5%, 2W	R50473
R5	Res, comp, 100K, 5%, 2W	R50104
R6	Res, comp, 33K, 5%, 2W	R50333
R7	Res, comp, 10K, 5%, 1/4W	R20103
R8	Res, comp, 10Ω, 5%, 1/4W	R20100
R9	Res, comp, 2.2K, 5%, 1/4W	R20222
R10	Res, comp, 4.7K, 5%, 1/4W	R20472
R11	Res, ww, 1Ω, 2W	R90001
R12	Res, ww, 1Ω, 2W	R90001
R13	Res, comp, 1K, 5%, 1/4W	R20102
R14	Res, comp, 220Ω, 5%, 1/4W	R20221
R15	Pot, trim, pc, 1K	R88102
R16	Res, comp, 1K, 5%, 1/4W	R20102
R17	Res, comp, 270Ω, 5%, 1/4W	R20271
R18	Res, comp, 270Ω, 5%, 1/4W	R20271
R19	Res, comp, 3.3K, 5%, 1/4W	R20332
VR1	Diode, zener, 15V, 5%, 1W, 1N4744A	VR4744
VR2	Diode, zener, 5.6V, 5%, 400 mW, 1N752A	VR7520

FILTER PC BD ASSY A2

REF DESIG	DESCRIPTION	P/N
---	FILTER PC BOARD ASSEMBLY	210402
C1-C8	Not used	---
C9	Cap, elect, 60μF, 450 Vdcw	C70001
C10	Cap, elect, 60μF, 450 Vdcw	C70001
C11	Cap, elect, 60μF, 450 Vdcw	C70001
C12-C15	Not used	---
C16	Cap, elect, 200μF, 150 Vdcw	C70002
R1	Res, comp, 100K, 5%, 2W	R50104
R2	Res, comp, 100K, 5%, 2W	R50104
R3	Res, comp, 100K, 5%, 2W	R50104

TABLE 11-1. VOLTAGE CHART

NOTE

The following voltages and waveforms are obtained when the supply is connected to a 117 Vac source. All plugs and receptacles of the supply should be mated with corresponding receptacles of the radio, and the radio should be set to the RECEIVE mode.

TEST POINT LOCATION	VOLTAGE OR WAVEFORM	COMMENTS
J2 pin 1 (+ HV) and pin 8 (common)	+750 ± 75 Vdc	WARNING: Dangerous high Voltage.
J2 pin 3 (-) to pin 8 (common)	-120 ± 20 Vdc	
J2 pin 2 (+) to pin 8 (common)	+240 ± 25 Vdc	WARNING: Dangerous high Voltage.
J2 pin 4 (+) J2 pin 8 (common)	+12.6 ± 0.5 Vdc	This is the regulated dc output and should have less than 150 MV peak to peak ripple.
J2 pin 5 and 6 to pin 7	+12.6 ± 0.6 Vrms	This voltage is applied to Transceiver filaments.
Cathode of A1CR17 (-) to chassis ground.	-0.6 ± 0.3 Vdc	A positive indication at this point indicates the loss of the -120 Vdc bias supply.

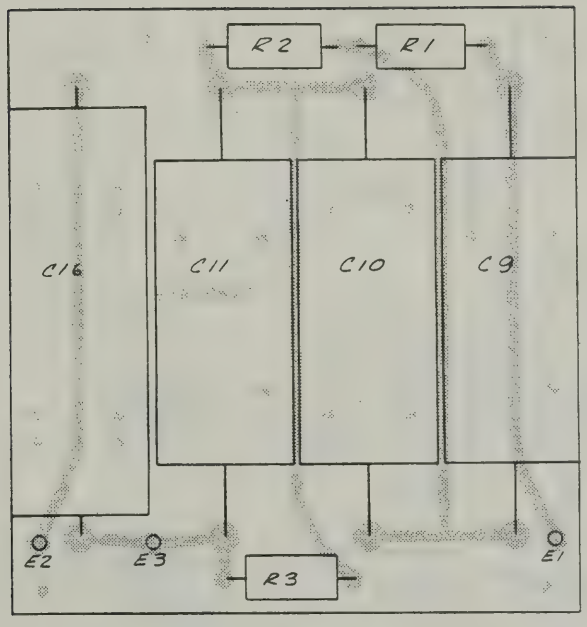


Figure 11-1. Filter PC Board Assembly A5A2

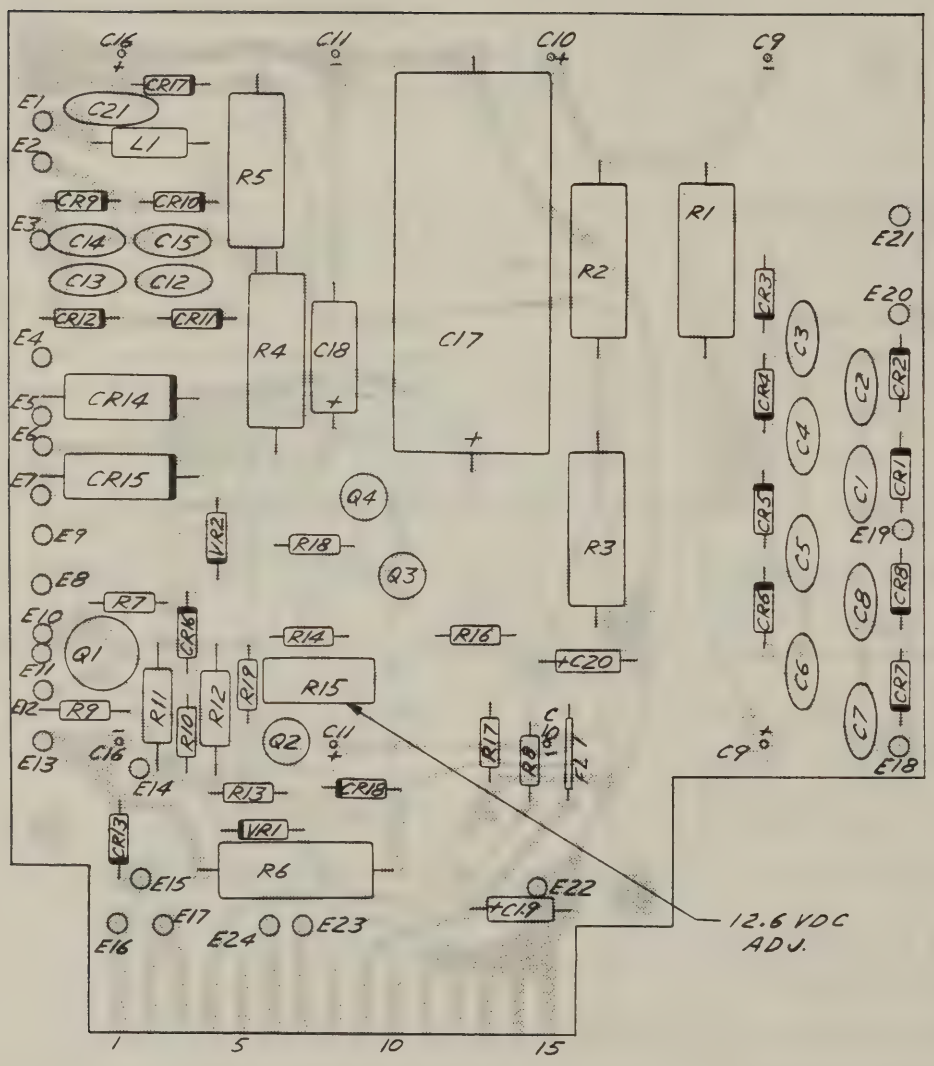
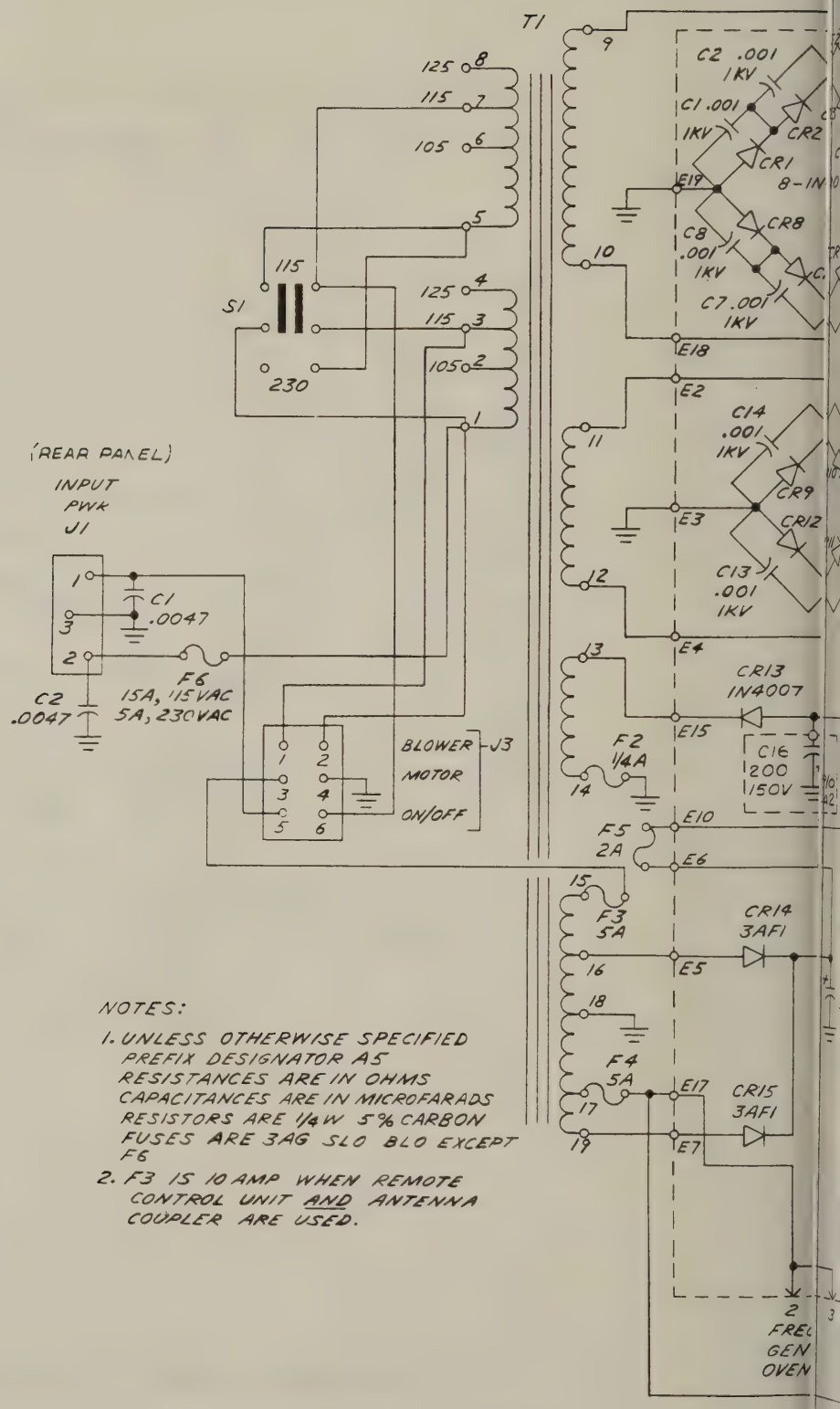


Figure 11-2. Regulator PC Board Assembly A5A1



NOTES:

1. UNLESS OTHERWISE SPECIFIED PREFIX DESIGNATOR AS RESISTANCES ARE IN OHMS CAPACITANCES ARE IN MICROFARADS RESISTORS ARE 1/4W 5% CARBON FUSES ARE 3AG SLO BLO EXCEPT F6
2. F3 IS 10 AMP WHEN REMOTE CONTROL UNIT AND ANTENNA COUPLER ARE USED.

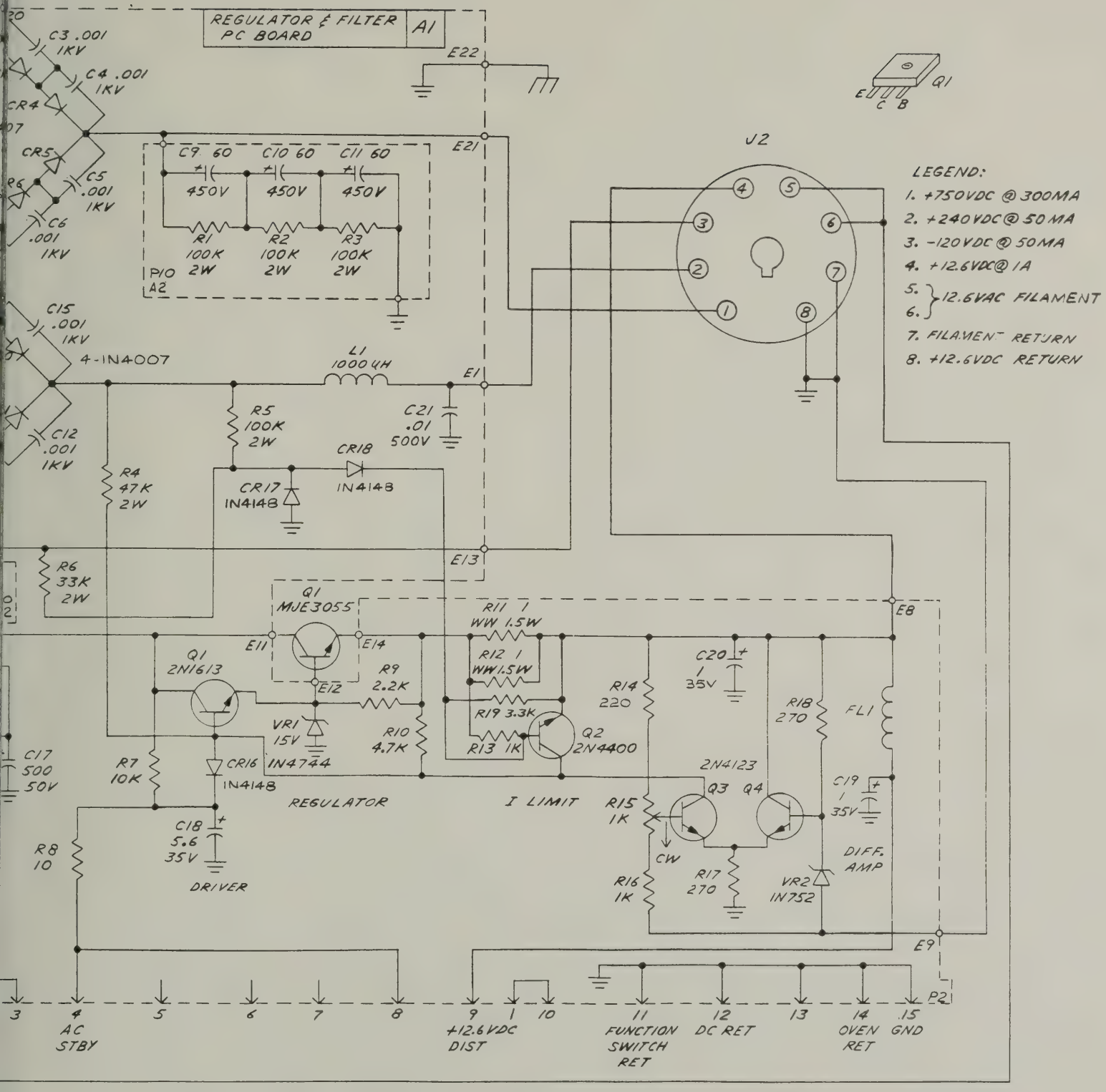
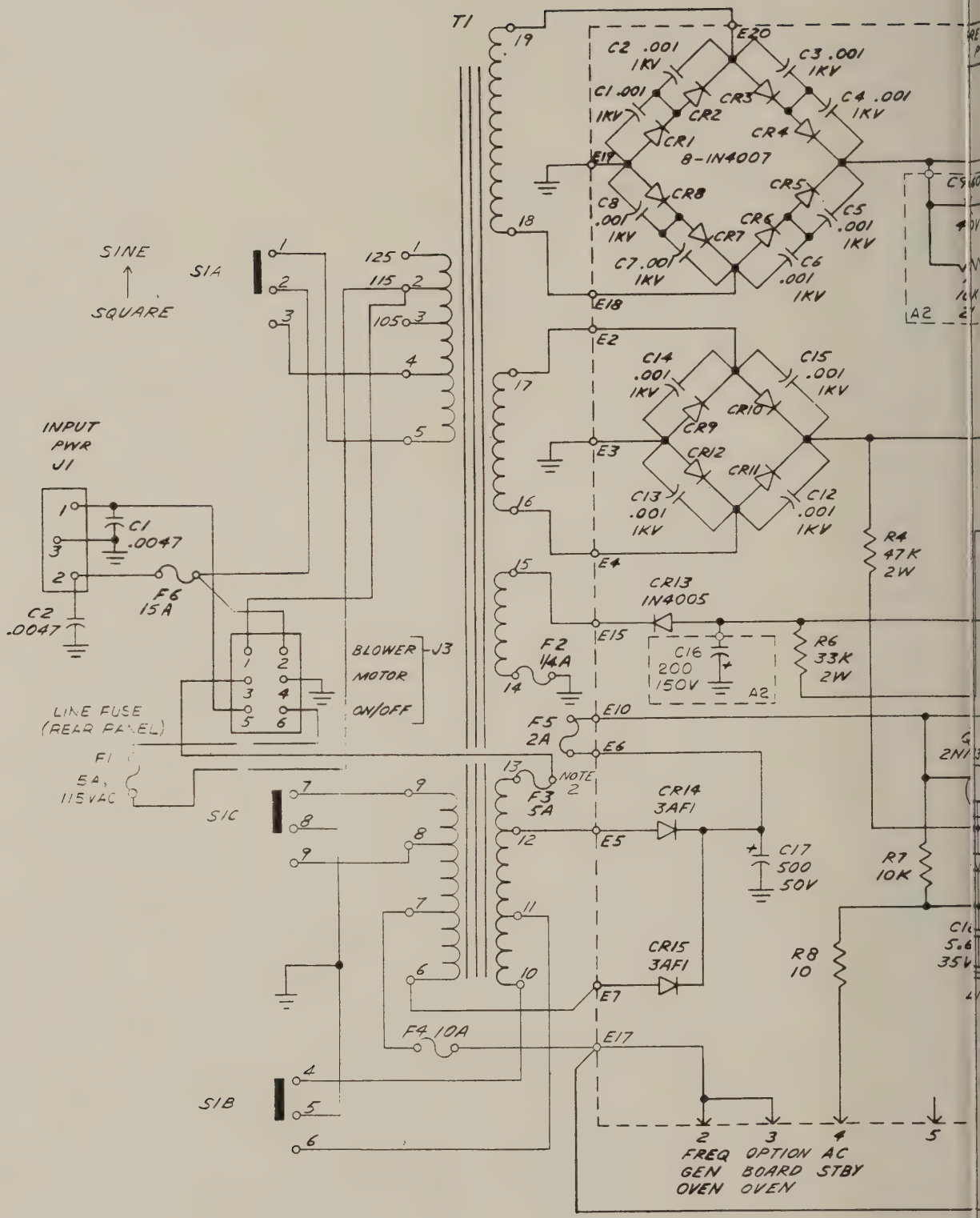
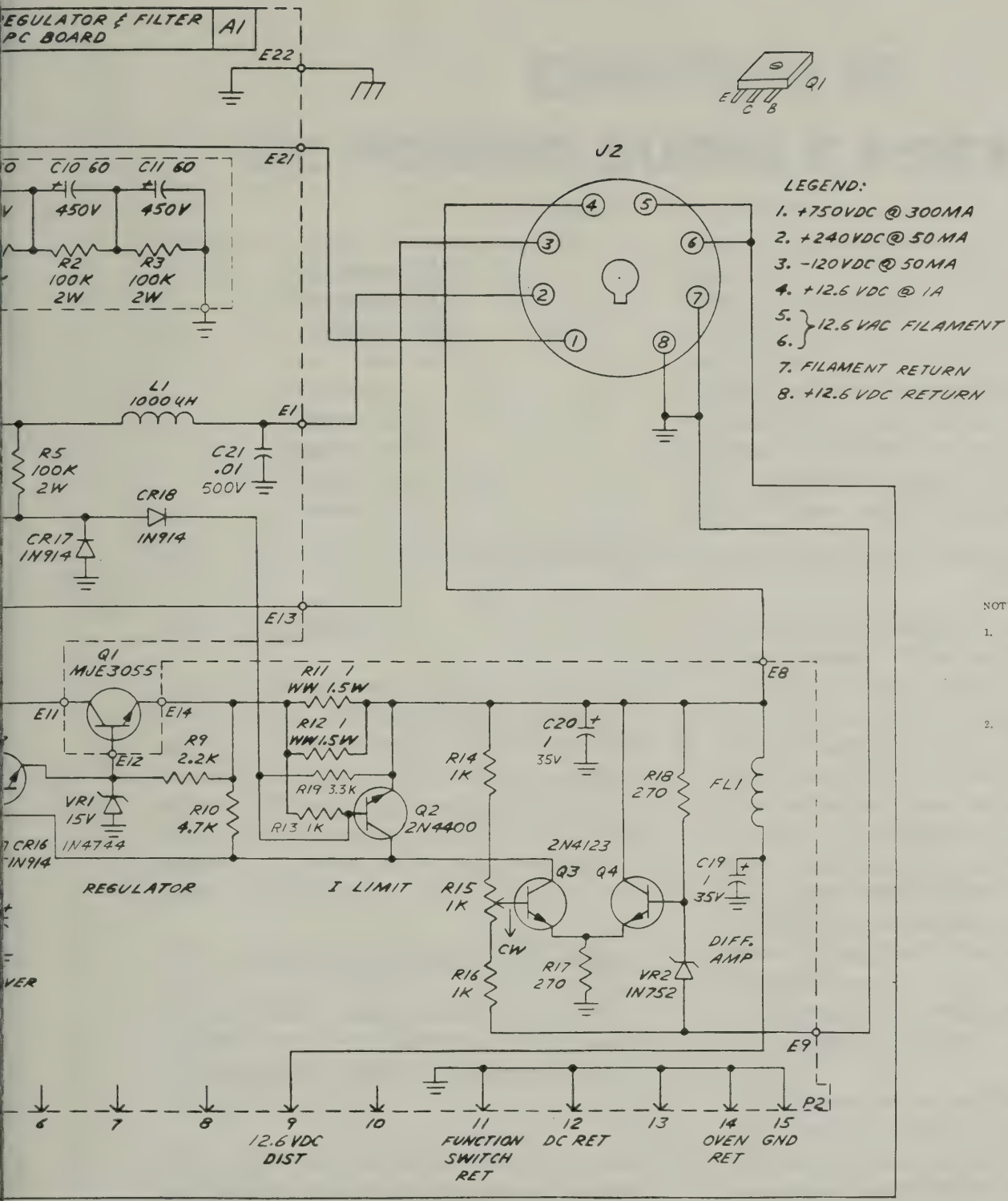


Figure 11-3. AC Power Supply (115/230 Vac) Schematic Diagram


T1
19
18
17
16
15
14
E20
E18
E17
E2
E3
E4
E15
E10
E6
E5
E7
E17
C2 .001 1KV
C3 .001 1KV
C1 .001 1KV
C4 .001 1KV
CR1
CR2
CR3
CR4
8-IN4007
CR5
CR8
CR6
CR7
C8 .001 1KV
C5 .001 1KV
C7 .001 1KV
C6 .001 1KV
C14 .001 1KV
C15 .001 1KV
CR10
CR9
CR12
CR11
C13 .001 1KV
C12 .001 1KV
R4 47K 2W
CR13 IN4005
C16 200 150V
A2
R6 33K 2W
F2 1/4A
F5 2A
F3 5A
NOTE 2
CR14 3AFI
C17 500 50V
R7 10K
R8 10
CR15 3AFI
F4 10A
SINE
SQUARE
S1A
S1C
S1B
125
115
105
INPUT PWR J1
C1 .0047
C2 .0047
F6 15A
BLOWER MOTOR ON/OFF
J3
LINE FUSE (REAR PANEL)
F1 5A, 115VAC
2 FREQ GEN OVEN
3 OPTION BOARD OVEN
4 AC STBY
5



NOTES:

1. Unless otherwise specified
   Prefix Designator A5
   Resistances are in ohms
   Capacitances are in microfarads
   Resistors are 1/4W 5% carbon
   Fuses are 3AG SLO-BLO except F6.

2. F3 is 10 Amp when Remote Control Unit and Antenna Coupler are used.

Figure 11-4. AC Power Supply (SINE/SQUARE) Schematic Diagram

CHAPTER 12
DC POWER SUPPLY ASSY A5

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Paragraph 12.1	General
Paragraph 12.2	13.6 Volt Operation
Paragraph 12.3	26 Volt Operation
----------	Parts List
Table 12-1	Voltage and Waveform Chart
Figure 12-1	Regulator/Filter PC Board A1
Figure 12-2	Starting Circuit PC Board A2
Figure 12-3	13.6 VDC Power Supply Schematic
Figure 12-4	26 VDC Power Supply Schematic

12.1 GENERAL.

The DC Power Supply enables operation of the SR-206/210 Transceiver on power sources of 13.2 or 26.4 Vdc (12 to 14 Vdc or 24 to 28 Vdc). It is installed in place of the AC Power Supply in sets for dc operation. Input power required for full output is 13.2 Vdc at 25 Amps or 26.4 Volts at 15 Amps.

12.2 BASIC 13.2 VOLT OPERATION.

The DC Power Supply consists of a two-transformer dc-dc converter and a 12.5 Vdc regulator. Refer to schematic diagram, figure 12-3.

Transistors Q1 and Q2 are used in a push-pull square wave oscillator circuit which alternately supplies current pulses to each half of the primary of power transformer T1. Positive feedback to the bases of transistors Q1 and Q2 is provided by saturating transformer A2T1. Transformer A2T1 will apply base current for approximately 100μsec, at which time the transformer saturates, base drive is reduced to zero, and drive is removed from both transistors. When the driven transistor is turned off, the field of power transformer T1 collapses, reversing the voltage across its primary windings. This voltage reversal is applied to transformer A2T1, which now turns the other transistor on for a period of approximately 100 μsec, and then the cycle repeats itself. In this manner, transistors Q1 and Q2 oscillate at a 5 kHz rate, effectively applying a square wave voltage to the primary of power transformer T1. The secondary windings of T1 supply the voltages for the Regulator and Filter PC Board.

The square wave oscillator mentioned above is operated in class B; and if it were not for the starting circuit, both transistors would be off when power is first applied, and no oscillations would occur. To overcome this situation, base current is initially applied to both transistors: Q1 and Q2. Any circuit unbalance or transient causes the circuit to oscillate in the class A mode. As soon as oscillation has been established, the class A bias current is removed, and the circuit oscillates in its normal class B mode.

Starting is accomplished by the Starting Circuit PCB, A5A2. As battery power is initially applied from relay K1, capacitors A2C2 and A2C3 charge through the base of transistor A2Q3. Transistor A2Q3 is turned on by this charging current, and thus turns on transistor A3Q2 and power transistor A2Q1. When transistor A2Q1 is turned on, approximately four Amp is applied to the center secondary terminal of transformer A2T1. This current is applied through the secondary of the transformer to the bases of power switching transistors Q1 and Q2. As A2C1, A2C2, and A2C3 approach full charge, charging current is reduced to the point that transistor A2Q3 cuts off, cutting off transistors A2Q2 and A2Q1. The starting current is present approximately 1/2 second; sufficient for Q1 and Q2 to start oscillating. Operation then continues in class B.

NOTE

If a malfunction of the radio causes an overload to the output of the supply, the oscillator will stop, and all converted voltage will be removed. If the overload is removed, the oscillator will not start unless the Transceiver is returned to either the OFF or STANDBY position, and back to RECEIVE or TRANSCEIVE.

The Regulator/Filter Board contains four rectifier circuits and a regulator. Diodes CR1 through CR8 comprise the rectifier for the +750 Vdc power amplifier plate voltage. Diodes CR9 through CR12 provide the +240 Vdc driver plate and power amplifier screen voltage. Diode CR13 is the rectifier for the -120 Vdc supply.

Diodes CR14 and CR15 provide unregulated dc for the series regulator circuit. The regulator consists of series pass transistor A5Q4 on the Regulator Board. Potentiometer R15 is factory set (and sealed) to adjust the output of the regulator to +12.5 Vdc. Do not reset this control.

Current limiting and short circuit protection is provided by the circuit of transistor Q2. If a current of greater than 1 Amp is drawn from the supply, the voltage drop across resistors R11 and R12 turns on and saturates limiting transistor Q2, which in turn reduces the drive to the series pass transistor, and the output voltage falls.

When the Transceiver is switched from OFF to STANDBY, a contact closure establishes continuity between pins 5 and 6 of power supply jack J3, and Q4 is energized. When Q4 is energized, battery voltage is applied to crystal ovens through pins 2 and 3 of the Regulator/Filter PCB, A5A1. Thus, in the standby mode, the only power in the Transceiver is applied to the ovens.

When the Transceiver Function switch is set to either the RECEIVE or TRANSCEIVE position, + battery voltage is applied to relay K1 through pin 5 of the A5A1 Regulator/Filter PCB. When relay K1 is energized, battery power is applied to power switching transistors A5Q2 and to the A5A2 Starting Circuit PCB.

12.3 26.4 VOLT OPERATION.

26.4 Vdc operation is accomplished by making changes in several components and connections as shown in figure 12-4. Otherwise, operation is similar.

For operation with the SR-1602 Remote Control System or the SR-610M Antenna Coupler, an additional circuit change is required to provide ballast resistance for the 12 Vdc motors. See schematic. R9 is 30Ω for the SR-1601/1602 and 25Ω for the SR-610M. VR1 provides a bypass for motor start current. If both Remote Control and Antenna Coupler are required, the ballast resistors will be installed in the respective units.

DC POWER SUPPLY ASSY A5

REF DESIG	DESCRIPTION	P/N
---	DC POWER SUPPLY ASSEMBLY	200400
A5A1	Regulator/Filter PC Board Assembly	200460
A5A2	Start Circuit PC Board Assembly	200470
C1	Capacitor, 500μF, 50V	C70003
C2	Capacitor, 50μF, 50V	C55067
C3	Capacitor, mylar, 0.1μF, 10%, 100 Vdcw	C20100
C4	Capacitor, mylar, 0.1μF, 10%, 100 Vdcw	C20100
C5	Capacitor, mylar, 0.1μF, 10%, 100 Vdcw	C20100
C6	Capacitor, mylar, 0.1μF, 10%, 100 Vdcw	C20100
C7	Capacitor, 1μF, 50V	200035
C8	Capacitor, 1μF, 50V	200035
C9	Capacitor, 1μF, 50V	200035
C10	Capacitor, .01μF, 10%, 500 Vdcw	C10100
C11	Capacitor, 0.22μF, 10%, 100 Vdcw	C20220
C12	Capacitor, .01μF, 10%, 500 Vdcw	C10100
CR1	Diode, si, 1 Amp, 200V, 1N4003	CR4003
CR2	Not used	---
CR3	Not used	---
CR4-CR5	Diode, si, 1 Amp, 200V, 1N4003	CR4003
F1	Fuse, slo-blo, 0.25A	F20025
F2	Fuse, slo-blo, 2A	F20200
F3	Fuse, slo-blo, 5A	F20500
F4	Fuse, slo-blo, 5A	F20500
F5	Fuse, slo-blo, 25A, 13.6V Unit	F22500
	Fuse, std, 15A, 26V Unit	F11500
F6	Fuse, slo-blo, 5A	F20500
F7	Fuse, slo-blo, 25A	F22500
F8	Fuse, slo-blo, 5A	F20500

DC POWER SUPPLY ASSY A5 (CONT.)

REF DESIG	DESCRIPTION	P/N
J1	Receptacle, 4 pin, Bat. Cable	J00208
J2	Receptacle, octal, 8 pin	X00701
J3	Receptacle, 6 pin	J00205
J4	Receptacle, 6 pin	J00205
K1	Relay, spdt, 25A, 12.5V	K10003
L1	Choke, 18μH, 25A	L32009
L2	Choke, 18μH, 25A	L32009
L3	Choke, 18μH, 25A	L32009
L4	Choke, 18μH, 25A	L32009
L5	Choke, hash, 5A	L32010
L6	Choke, hash, 5A	L32010
L7	Choke, 100μH, 2A	200464
L8	Choke, 100μH, 2A	200464
L9	Choke, 100μH, 2A	200464
P1	Plug, 4 pin, high current	P00208
P2	Plug, 6 pin	P00205
Q1	Transistor, 2N5085, 13.6 Volt Unit	Q56850
	Transistor, 2N5303, 26 Volt Unit	Q53030
Q2	Transistor, 2N5085, 13.6 Volt Unit	Q56850
	Transistor, 2N5303, 26 Volt Unit	Q53030
Q3	Transistor, MJE3055	Q00001
Q4	Transistor, MJE3055	Q00001
R1	Res, ww, 35Ω, 12W	R90004
R2	Res, ww, 35Ω, 12W	R90004
R3	Res, ww, 1Ω, 8W	R90003
R4	Not used	---
R5	Res, 130Ω, 3W, Ohmite 2763, 26V	206100
R6	Res, 130Ω, 3W, Ohmite 2763, 26V	206100
R7	Res, 62Ω, 5W, Ohmite 2865, 26V	206101
R8	Res, 7.5Ω, 25W, Dale RH-25, 26V, SR-210 Oven	206102
	Res, 10Ω, 25W, Dale RH-25, 26V, SR-206 Oven	206103
R9	Res, 25Ω, 25W, Dale RH-25, 26V with SR-606/610	206104
	Res, 30Ω, 25W, Dale RH-25, 26V with SR-1601/1602	206105
R10	Res, value factory selected	---
R11	Res, 100Ω, 2W, 13.6 Volt Unit	R50101
	Res, 270Ω, 5W, 26 Volt Unit	206106
R12	Res, 1K, 5%, 1/4W	R20102
R13-R15	Not used	---
R16	Res, ww, 1Ω, 8W	R90003
R17	Res, comp, 5%, 2W: For 13.6V 180Ω	R50181
	For 26V 560Ω	R50561

REGULATOR/FILTER PC BD ASSY A5A1

REF DESIG	DESCRIPTION	P/N
A5A1	Regulator/Filter PC Board Assembly	200460
C1	Capacitor, Elect, 60 μf, 450 VDC	C70001
C2	Capacitor, Elect, 60 μf, 450 VDC	C70001
C3	Capacitor, Elect, 60 μf, 450 VDC	C70001
C4	Capacitor, Disc, .01, 500 VDC	C10100
C5	Capacitor, Elect, 200 μf, 150 VDC	C70002
C6	Capacitor, Tant, 1 μf, 50 VDC	200035
C7	Capacitor, Elect, 500 μf, 50 VDC	C70003
C8	Capacitor, Tant, 1 μf, 50 VDC	200035
C9	Capacitor, Disc, .01 μf, 1.6 KV	C00001
C10	Capacitor, Disc, .01 μf, 1.6 KV	C00001
C11	Capacitor, Disc, .01 μf, 1.6 KV	C00001
C12	Capacitor, Disc, .01 μf, 500V	C10100
C13 thru C15	Capacitor, Disc, .01 μf, 500V	C10100
CR1 thru CR12	Diode, Solitron TS-60, 600V	CR0201
CR13	Diode, Solitron TS-60, 600V	CR0201
CR14	Diode, NS3001, 100V, 3A	CR0202
CR15	Diode, NS3001, 100V, 3A	CR0202
CR16	Diode, 1N4003, 200V, 1A	CR4003
CR17	Diode, Si, 1N4003	CR4003
CR18	Diode, Si, 1N4003	CR4003
CR19	Diode, 1N4003, 200V, 1A	CR4003
CR20	Diode, 1N4003, 200V, 1A	CR4003
FL1	Choke, Ferrite Bead	FL0002
FL2	Choke, Ferrite Bead	FL0002
L1	Choke, 1000 μh	L10102
L2	Choke, 1000 μh, 800mA	L32015
L3	Choke, 100 μh, 2A	200464
Q1	Transistor, 2N1613, Si, NPN	Q1e130
Q2	Transistor, 2N4400, Si, NPN	Q44000
Q3	Transistor, 2N4123, Si, NPN,	Q41230
Q4	Transistor, 2N4123, Si, NPN	Q41230
R1	Resistor, Comp, 100K, 2W, 5%	R50104
R2	Resistor, Comp, 100K, 2W, 5%	R50104
R3	Resistor, Comp, 100K, 2W, 5%	R50104
R4	Resistor, Comp, 47K, 2W, 5%	R50473
R5	Resistor, Comp, 100K, 2W, 5%	R50104

REGULATOR/FILTER PC BD ASSY A5A1 (CONT.)

REF DESIG	DESCRIPTION	P/N
R6	Resistor, Comp, 33K, 2W, 5%	R50333
R9	Resistor, Comp, 3.3K, 1/4W, 5%	R20222
R10	Resistor, Comp, 4.7K, 1/4W, 5%	R20472
R11	Resistor, W.W., 1 ohm, 1.5W	R90001
R12	Resistor, W.W., 1 ohm, 1.5W	R90001
R13	Res, Comp, 220Ω, 1/4W, 5%	R20221
R14	Resistor, Comp, 1K, 1/4W, 5%	R20102
R15	Resistor, Var, Comp, 1K	R88102
R16	Resistor, Comp, 1K, 1/4W, 5%	R20102
R17	Resistor, Comp, 270, 1/4W, 5%	R20271
R18	Resistor, Comp, 270, 1/4W, 5%	R20271
VR1	Diode, Zener, 1N4745A, 15V, 1W	VR4745
VR2	Diode, Zener, 1N752, 5.6V, 400 MW	VR7520

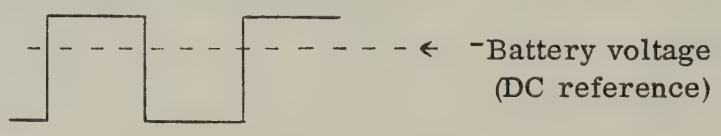
START CIRCUIT PC BD ASSY A5A2

REF DESIG	DESCRIPTION	P/N
A5A2	Start Circuit PC Board Assembly	200470
C1	Capacitor, Elect, 10 μf, 20VDC	C41064
C2	Capacitor, Elect, 10 μf, 20 VDC	C41064
C3	Capacitor, Elect, 10 μf, 20 VDC	C41064
C4	Capacitor, Disc, Cer, .1 μf, 25 VDC	C11000
C5	Capacitor, Disc, Cer, .1 μf, 25 VDC	C11000
CR3	Diode, Si, 1N914	CR9140
Q1	Transistor, 2N5296, NPN	Q52960
Q2	Transistor, 2N4125, PNP	Q41250
Q3	Transistor, 2N4123, NPN	Q41230
R3	Resistor, Comp, 1K, 1/4W, 5%	R20102
R4	Resistor, Comp, 10 ohm, 1/2W, 13.6 VDC Unit	R30100
R4	Resistor, Comp, 22 ohm, 1/2W, 26 VDC Unit	R30220
R5	Resistor, Comp, 10 ohm, 1/2W, 13.6 VDC Unit	R30100
R5	Resistor, Comp, 22 ohm, 1/2W, 26 VDC Unit	R30220
R6	Resistor, Comp, 1K, 1/4W, 5%	R20102
R7	Resistor, Comp, 1K, 1/4W, 5%	R20102
R8	Resistor, Comp, 100 ohms, 1/2W, 5%	R30101
R9	Resistor, Comp, 5.6K, 1/4W, 5%	R20562
R10	Resistor, Comp, 1K, 1/4W, 5%	R20102
R11	Resistor, Comp, 10 ohm, 1/2W, 5%	R30100
R11	Resistor, Comp, 22 ohm, 1/2W, 5%, 26 VDC Unit	R30220
T1	Transformer, Timing, Torroid	T00103
VR1	Diode, Zener, 12V, 1W, 26 VDC Unit	VR4742

TABLE 12-1. VOLTAGE AND WAVEFORM CHART

NOTE

The following voltages and waveforms are obtained when the AR-260 DC-to-DC converter is connected to a battery voltage of 13.6 volts. All plugs and receptacles of the converter should be mated with corresponding receptacles of the radio, and the radio should be set to the RECEIVE mode.

TEST POINT LOCATION	VOLTAGE OR WAVEFORM	COMMENTS
J3 pin 1 (+) and pin 2 (-)	+13.6 Volts (Battery Voltage)	This voltage should only appear when the Transceiver is set to Receive or Transmit.
J2 pin 1 (+ HV) and pin 8 (common)	+750 ± 75 Vdc	WARNING: Dangerous high Voltage.
J2 pin 3 (-) to pin 8 (common)	-120 ± 20 Vdc	
J2 pin 2 (+) to pin 8 (common)	+240 ± 25 Vdc	WARNING: Dangerous high Voltage
J2 pin 4 (+) J2 pin 8 (common)	+12.5 ± .5 Vdc	This is the regulated dc output and should have less than 150 MV peak to peak ripple.
J2 pin 5 and 6 (+) to pin 7 (-)	+13.6 Volts (Battery Voltage)	This voltage is applied to Transceiver filaments.
Cathode of A1CR17 (-) to chassis ground.	-0.6 ± .3 Vdc	A positive indication at this point indicates the loss of the -120 Vdc bias supply.
Q1 or Q2; base to emitter	5 kHz square wave, 6 ± 1 Volts peak-to-peak 	

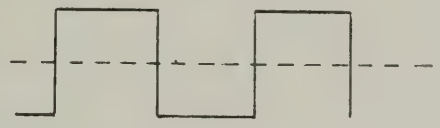
TEST POINT LOCATION	VOLTAGE OR WAVEFORM	COMMENTS
Q1 or Q2; collector to emitter	5 kHz square wave, 20 ± 5 Volts peak-to-peak 	+ Battery DC Reference

Figure 12-1. Regulator/Filter PC Board Assembly A5A1, Component Locations

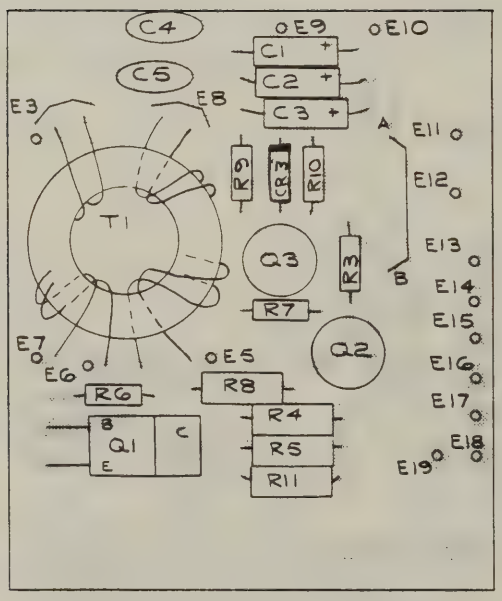
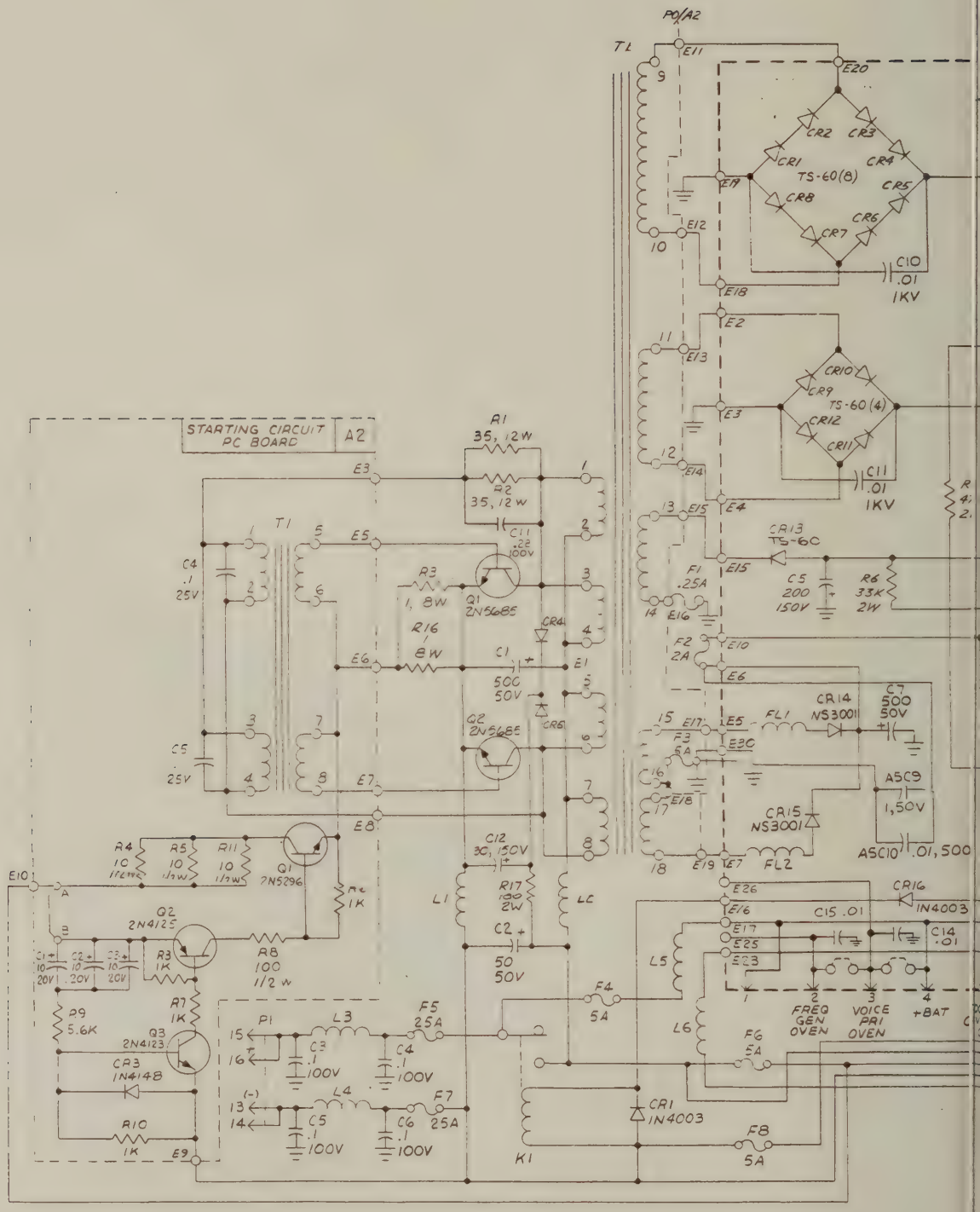


Figure 12-2. Starting Circuit PC Board Assembly A5A2, Component Locations


P0/A2
T1
E11
E20
CR2
CR3
CR1
CR4
TS-60(8)
CR5
CR8
CR6
CR7
E17
E12
10
C10
.01
1KV
E18
E2
11
E13
CR10
CR9
TS-60(4)
CR12
CR11
E3
12
E14
C11
.01
1KV
E4
13
E15
CR13
TS-60
F1
.25A
C5
200
150V
R6
33K
2W
14
E16
F2
2A
E10
E6
CR14
NS3001
C7
500
50V
15
E17
E5
FL1
F3
5A
E30
16
E18
A5C9
1,50V
CR15
NS3001
A5C10
.01,500
17
18
E19
E7
FL2
E26
CR16
IN4003
E16
C15 .01
C14
.01
E17
E25
E23
1
2
FREQ
GEN
OVEN
3
VOICE
PRI
OVEN
4
+BAT
L5
L6
F6
5A
CR1
IN4003
F8
5A
K1
STARTING CIRCUIT
PC BOARD
A2
A1
35, 12W
E3
A2
35, 12W
1
C11
.22
100V
2
T1
C4
.1
25V
E5
R3
1, 8W
Q1
2N5685
3
R16
8W
CR4
4
E6
C1
500
50V
E1
5
CR6
Q2
2N5685
6
C5
.25V
7
E7
8
E8
R4
10
1/2W
R5
10
1/2W
R11
10
1/2W
Q1
2N5296
E10
A
1K
C12
30, 150V
R17
100
2W
L1
LC
Q2
2N4125
B
C1
10
20V
C2
10
20V
C3
10
20V
R3
1K
R8
100
1/2 W
C2
50
50V
F4
5A
R7
1K
P9
5.6K
Q3
2N4123
P1
15
16
L3
C3
.1
100V
C4
.1
100V
F5
25A
CR3
IN4148
13
14
(-)
L4
C5
.1
100V
C6
.1
100V
F7
25A
R10
1K
E9

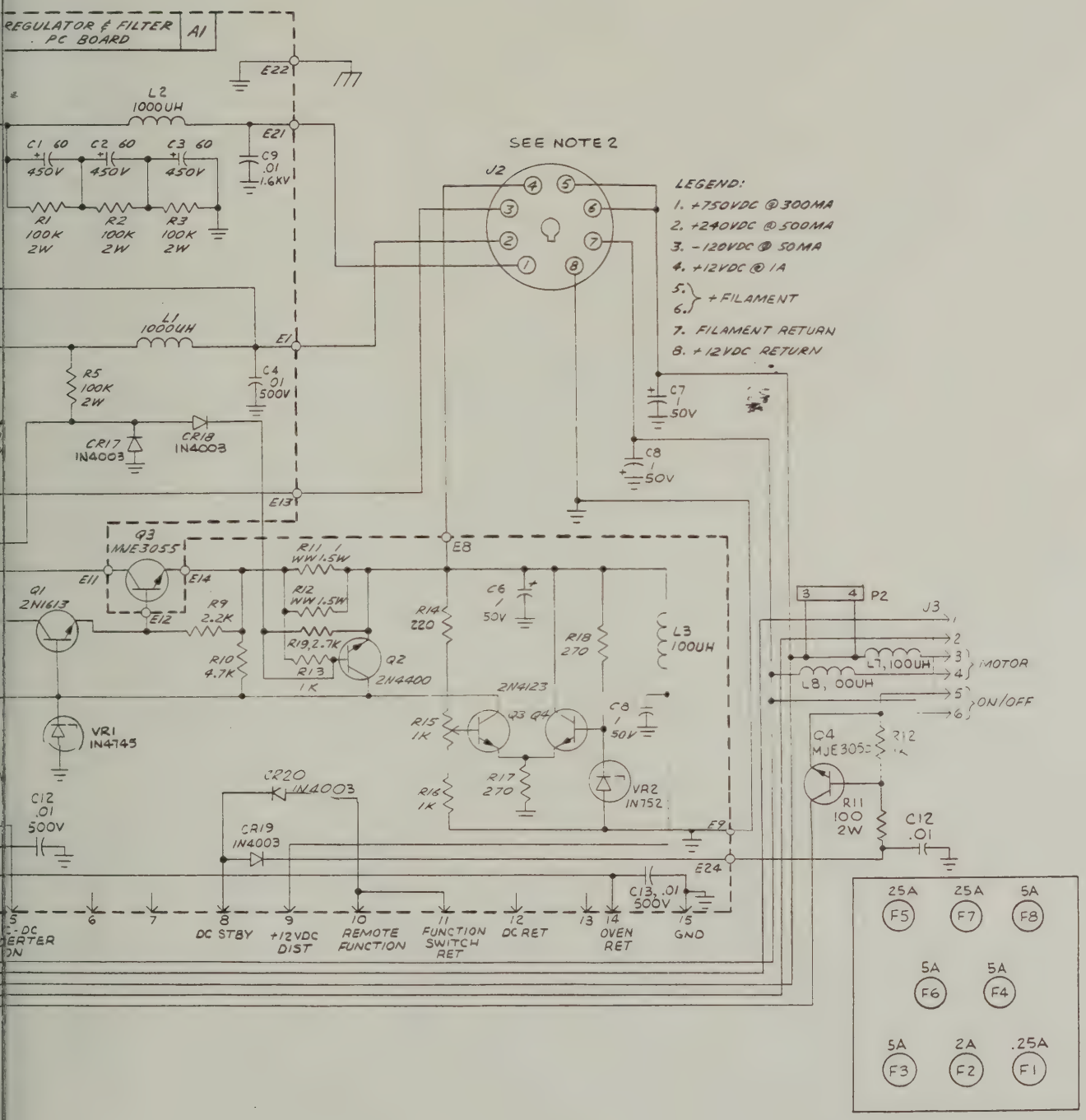
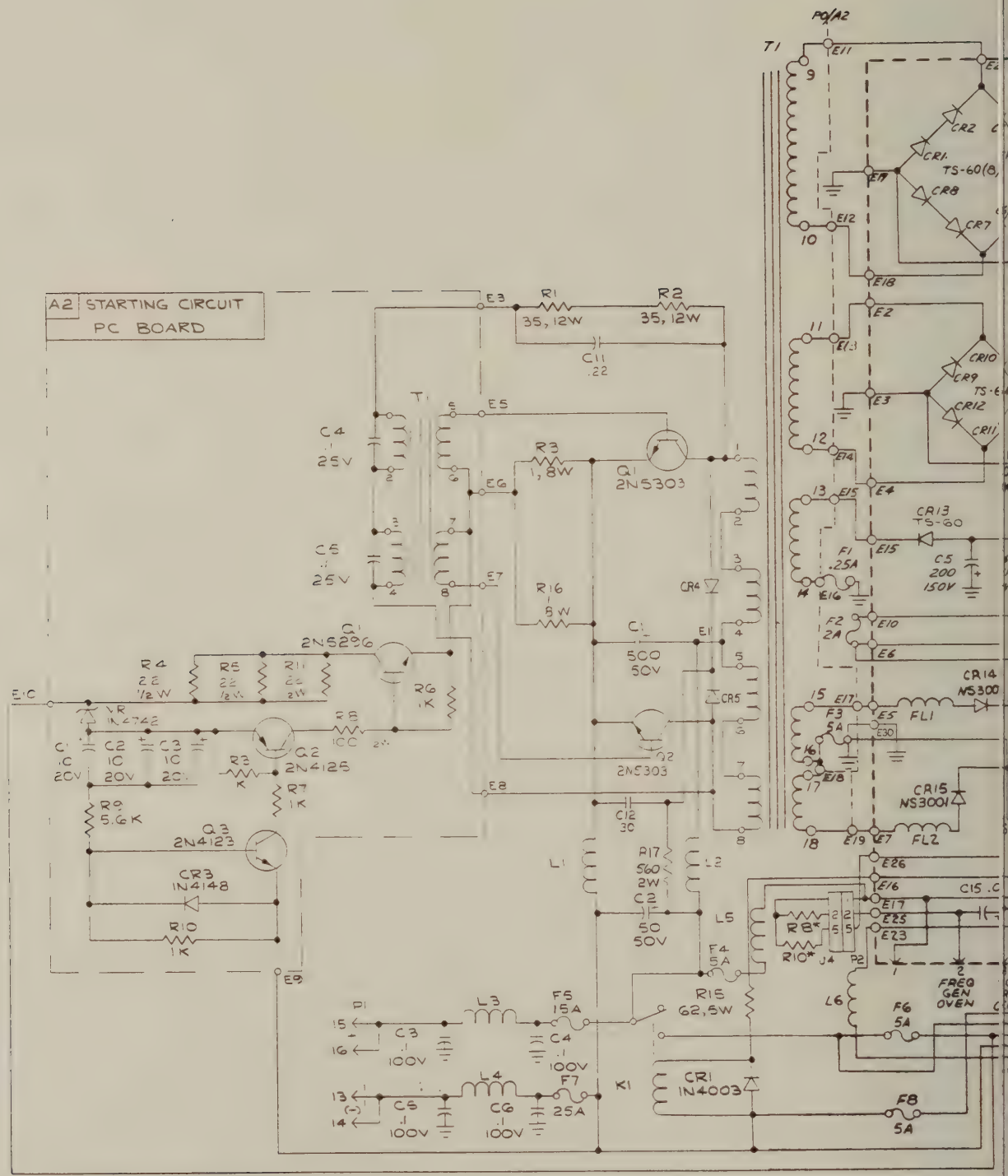


Figure 12-3. 12V DC Power Supply, Schematic Diagram


A2 STARTING CIRCUIT
PC BOARD
P6/A2
T1
R1
35, 12W
R2
35, 12W
C11
.22
C4
.1
25V
C5
.1
25V
R3
1, 8W
Q1
2N5303
R16
8W
C1
500
50V
Q2
2N5303
CR4
CR5
CR13
TS-60
F1
.25A
C5
200
150V
F2
2A
CR14
NS3001
F3
5A
FL1
CR15
NS3001
FL2
C1
2N5296
R4
2.2
1/2W
R5
22
1/2W
R11
22
2W
R6
1K
R8
100
R7
1K
R9
5.6K
Q3
2N4123
CR3
IN4148
R10
1K
C2
10
20V
C3
10
20V
R17
560
2W
C2
50
50V
L1
L2
L5
F4
5A
R15
62, 5W
L3
L4
L6
F5
15A
F6
5A
F7
25A
F8
5A
C3
.1
100V
C4
.1
100V
C5
.1
100V
C6
.1
100V
K1
CR1
IN4003
FREQ
GEN
OVEN
E1C
E9
E8
E7
E6
E5
E4
E3
E2
E1
E10
E11
E12
E13
E14
E15
E16
E17
E18
E19
E23
E25
E26
E30
P1
P2
J4
R8*
R10*

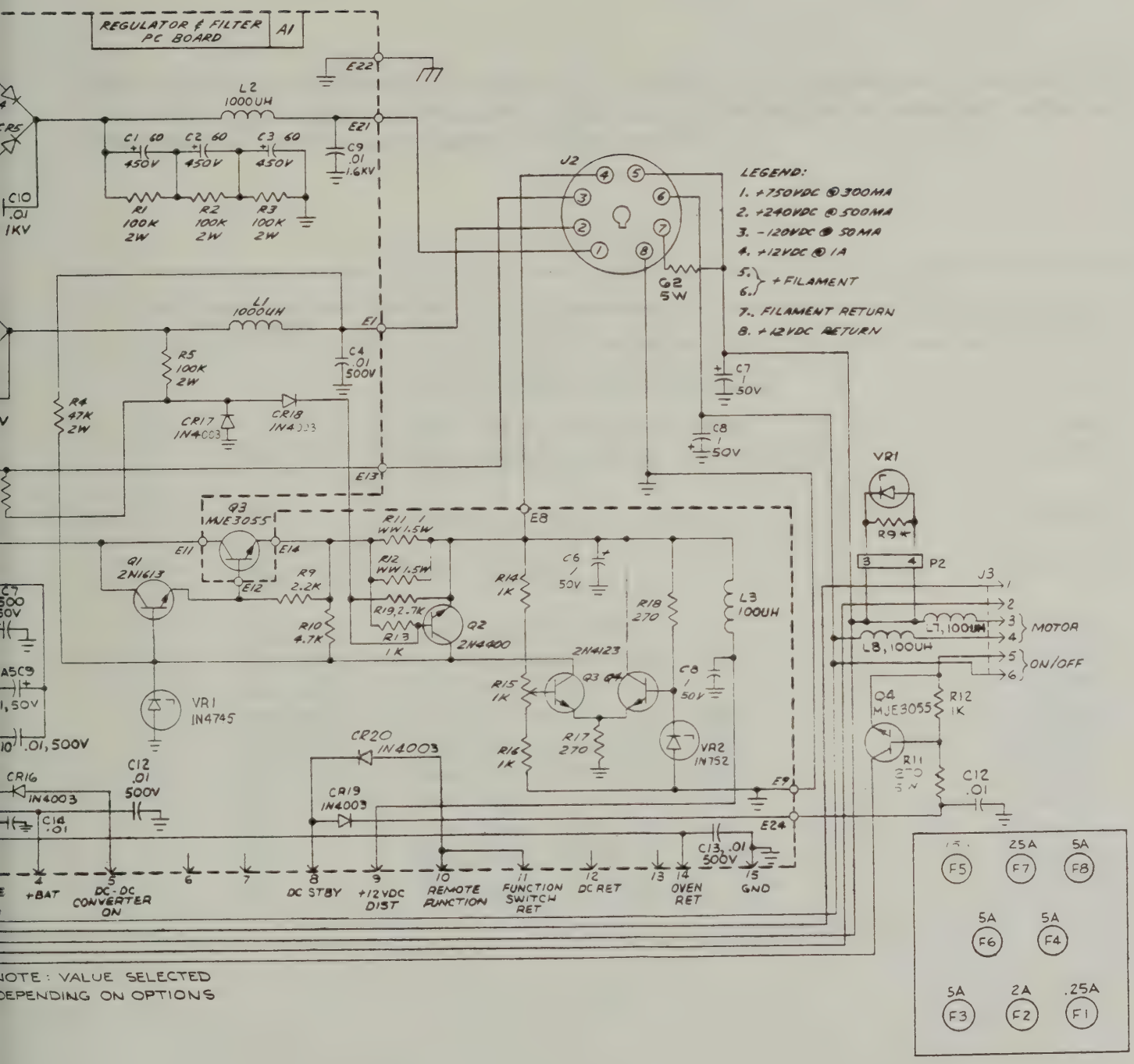


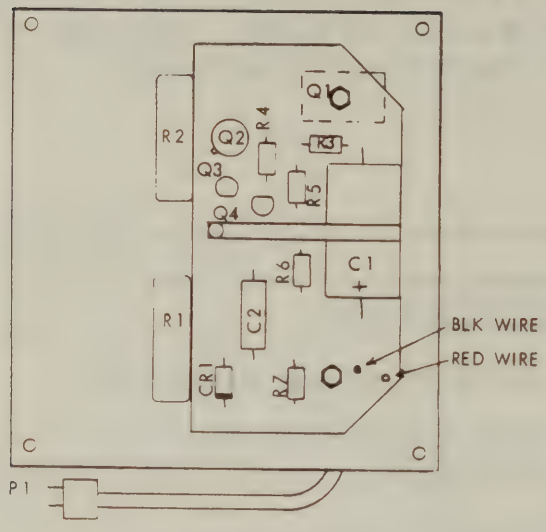
Figure 12-4. 24V DC Power Supply, Schematic Diagram

ADDENDUM

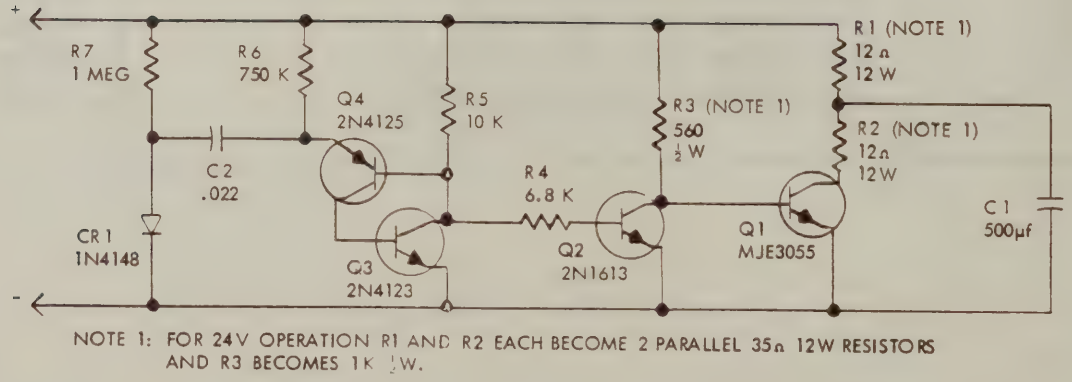
RFI SUPPRESSOR FOR SR-206/210 TRANSCEIVER

On dc operated sets without a fan option, the P/N 200454 RFI Suppressor is attached to the rear panel and plugged into J4 in place of the fan. Following are the parts list, parts location diagram, and schematic diagram for this assembly.

REF DESIG	DESCRIPTION	P/N
---	RFI SUPPRESSOR ASSEMBLY	200454
C1	Cap, elect, 500 μF, 50 Vdcw	C70003
C2	Cap, mylar, .022 μF, 10%, 100 Vdcw	C20022
CR1	Diode, si, signal, 1N4148	CR4148
P1	Plug, 4 pin	P00200
R1 (12V)	Res, ww, 12Ω, 12W	R90002
R1 (24V)	2 each, Res, ww, 35Ω, 12W	R90004
R2 (12V)	Res, ww, 12Ω, 12W	R90002
R2 (24V)	2 each, Res, ww, 35Ω, 12W	R90004
R3 (12V)	Res, comp, 560Ω, 5%, 1/2W	R30561
R3 (24V)	Res, comp, 1.0K, 5%, 1/2W	R30102
R4	Res, comp, 6.8K, 5%, 1/4W	R20682
R5	Res, comp, 10K, 5%, 1/4W	R20103
R6	Res, comp, 750K, 5%, 1/4W	R20754
R7	Res, comp, 1.0 meg, 5%, 1/4W	R20105



Component Locations



NOTE 1: FOR 24V OPERATION R1 AND R2 EACH BECOME 2 PARALLEL 35Ω 12W RESISTORS AND R3 BECOMES 1K ½W.

Schematic Diagram

CHAPTER 13
FREQUENCY GENERATOR ASSY A6

TABLE OF CONTENTS

Paragraph 13.1	General
Paragraph 13.2	Clarifier Module A6A11
Paragraph 13.3	Channel Oscillator Module
----------	Parts List
Figure 13-1	Channel Osc and Clarifier Boards
Figure 13-2	Frequency Generator Board
Figure 13-3	Frequency Generator Schematic

13.1 GENERAL.

There are three types of frequency generator assemblies: a simplex type A6 board, a duplex (or marine) type A6 board, and a duplex type A8 board. The A8 board provides the second frequency for any channel requiring independent transmit and receive frequencies. Since this manual is set up for non-marine Transceivers, only the simplex type A6 version is documented here.

The Frequency Generator Assembly, shown schematically in Figure 13-3 and pictorially in Figure 13-2, provides all injection frequencies necessary for transceiver operation. Q2 and Q4 are the usb and lsb carrier oscillators and are activated depending on mode. The two separate oscillators are gated by Q3 and Q5. Q6 is the output driver to the IF/Audio Module. CR5-CR6 and CR15-CR16 provide internal agc control of level. R15 and R24 equalize level output. R30 adjusts output level.

In am transmit, am equivalent is used rather than true am; i.e., carrier plus only one sideband. The usb carrier oscillator is on in am. However, am receive is true envelope detection. To prevent detection from occurring, Q2 is turned off in receive only by CR4. The output of second local oscillator, Q9, is buffered by driver Q10. Usb and lsb crystal selection is provided by gates Q7 and Q8. R46 adjusts output level.

13.2 CLARIFIER MODULE A6A11.

The Clarifier Module, shown in Figure 13-3, operates in conjunction with second oscillator Q9. By appropriate usb/lsb selection with Q2 and Q3, varicap diodes CR2 and CR9 are placed in series with the crystals and allow, through front panel control, a range of ± 150 Hz to be tuned on the second lo injection frequency. This permits operation with stations off frequency. The clarifier is normally enabled in receive only. Q1 is the gate which enables the clarifier.

13.3 CHANNEL OSCILLATOR MODULE.

Each channel oscillator, A6A1 through A6A10, shown schematically in Figure 13-3, is a separate module dc-controlled by the channel selector switch. Four bands cover the oscillator range of 3.1 to 31.5 MHz. Channel frequency bands are:

1.6-3.5 MHz Low Band A
3.5-12.0 MHz Low Band B
12.0-18.0 MHz High Band A
18.0-30.0 MHz High Band B

Channel frequency is set by C1, available from the side without module removal. All oscillators are sampled across a common load, R1 and R2, and amplified by driver Q1. R4 adjusts output level on all channels.

REF DESIG	DESCRIPTION	P/N
---	FREQUENCY GENERATOR PC BOARD ASSY	
	6 channel	200500-6
	10 channel	200500-10
A6A1	Channel Oscillator PC Board, as listed below:	
thru	1.6-3.5 MHz	200580-1
A6A10	3.5-12.0 MHz	200580-2
	12.0-18.0 MHz	200580-3
	18.0-30.0 MHz	200580-4
A6A11	Clarifier PC Board (option)	200560
C1	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C2	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C3	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C4	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C5	Cap, cer, 0.1μF, +80-20%, 25 Vdcw	C11000
C6	Cap, mica, 6pF, 5%, 500 Vdcw	C05060
C7	Cap, air, var, 2.2-34.0pF	C60001
C8	Cap, mica, 2000pF, 5%, 500 Vdcw	C06202
C9	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C10	Cap, mica, 220pF, 5%, 500 Vdcw	C05221
C11	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C12	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C13	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C14	Cap, cer, 0.1μF, +80-20%, 25 Vdcw	C11000
C15	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C16	Cap, mica, 6pF, 5%, 500 Vdcw	C05060
C17	Cap, air, var, 2.2-34.0pF	C60001
C18	Cap, mica, 2000pF, 5%, 500 Vdcw	C06202
C19	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C20	Cap, mica, 220pF, 5%, 500 Vdcw	C05221
C21	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C22	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C23	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C24	Cap, mica, 390pF, 5%, 500 Vdcw	C05391
C25	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C26	Cap, air, var, 2.2-34.0pF	C60001
C27	Cap, mica, 18pF, 5%, 500 Vdcw	C05180
C28	Not used	---
C29	Not used	---
C30	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C31	Cap, cer, .01μF, 20%, 500 Vdcw	C10100

FREQUENCY GENERATOR PC BD ASSY (CONT.)

REF DESIG	DESCRIPTION	P/N
C32	Cap, mica, 18pF, 5%, 500 Vdcw	C05180
C33	Cap, air, var, 2.2-34pF	C60001
C34	Not used	---
C35	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C36	Cap, mica, 470pF, 5%, 500 Vdcw	C06471
C37	Cap, mica, 1000pF, 5%, 500 Vdcw	C06102
C38	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C39	Cap, mica, 220pF, 5%, 500 Vdcw	C05221
C40	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C41	Cap, mica, ___pF, 5%, 500 Vdcw	
	(1.5 MHz IF: 100pF)	C05101
	(1.4 MHz IF: 110pF)	C05111
CR1	Diode, si, signal, 1N4148	CR4148
CR2	Diode, si, signal, 1N4148	CR4148
CR3	Not used	---
CR4	Diode, si, signal, 1N4148	CR4148
CR5	Diode, si, signal, 1N4148	CR4148
CR6	Diode, si, signal, 1N4148	CR4148
CR7	Diode, si, signal, 1N4148	CR4148
CR8	Diode, si, signal, 1N4148	CR4148
CR9	Diode, si, signal, 1N4148	CR4148
CR10	Not used	---
CR11	Not used	---
CR12	Diode, si, signal, 1N4148	CR4148
CR13	Diode, si, signal, 1N4148	CR4148
CR14	Not used	---
CR15	Diode, si, signal, 1N4148	CR4148
CR16	Diode, si, signal, 1N4148	CR4148
CR17	Diode, si, signal, 1N4148	CR4148
CR18	Diode, si, signal, 1N4148	CR4148
CR19	Not used	---
CR20	Not used	---
CR21	Diode, si, signal, 1N4148	CR4148
CR22	Diode, si, signal, 1N4148	CR4148
CR23	Diode, si, signal, 1N4148	CR4148
CR24	Diode, si, signal, 1N4148	CR4148
HR1	Oven, crystal, as listed below:	
	6 channel thermostat: snap-action	HR1001
	10 channel thermostat: snap-action	HR1002
L1	Choke, rf, 1 mH	L10102
L2	Choke, rf, 330μH	L10331
L3	Choke, rf, 75μH	L10750
L4	Choke, rf, 1 mH	L10102
L5	Choke, rf, 100μH	L10101

FREQUENCY GENERATOR PC BD ASSY (CONT.)

REF DESIG	DESCRIPTION	P/N
L6	Choke, rf, 180μH	L10181
L7	Choke, rf, 180μH	L10181
Q1	Transistor, npn, 2N5179	Q51790
Q2	Transistor, npn, 2N4123	Q41230
Q3	Transistor, npn, 2N4123	Q41230
Q4	Transistor, npn, 2N4123	Q41230
Q5	Transistor, npn, 2N4123	Q41230
Q6	Transistor, npn, 2N4123	Q41230
Q7	Transistor, npn, 2N4123	Q41230
Q8	Transistor, npn, 2N4123	Q41230
Q9	Transistor, npn, 2N5179	Q51790
Q10	Transistor, npn, 2N4123	Q41230
R1	Res, comp, 10Ω, 5%, 1/4W	R20100
R2	Res, comp, 100Ω, 5%, 1/4W	R20101
R3	Res, comp, 100Ω, 5%, 1/4W	R20101
R4	Pot, trim, pc, 100Ω	R88101
R5	Res, comp, 330Ω, 5%, 1/4W	R20331
R6	Res, comp, 12K, 5%, 1/4W	R20123
R7	Res, comp, 10K, 5%, 1/4W	R20103
R8	Res, comp, 100Ω, 5%, 1/4W	R20101
R9	Res, comp, 27Ω, 5%, 1/4W	R20270
R10	Res, comp, 1K, 5%, 1/4W	R20102
R11	Res, comp, 15K, 5%, 1/4W	R20153
R12	Res, comp, 10K, 5%, 1/4W	R20103
R13	Res, comp, 150K, 5%, 1/4W	R20154
R14	Res, comp, 4.7K, 5%, 1/4W	R20472
R15	Pot, trim, pc, min, 5K	R89502
R16	Res, comp, 10K, 5%, 1/4W	R20103
R17	Res, comp, 10K, 5%, 1/4W	R20103
R18	Res, comp, 1K, 5%, 1/4W	R20102
R19	Res, comp, 100Ω, 5%, 1/4W	R20101
R20	Res, comp, 15K, 5%, 1/4W	R20153
R21	Res, comp, 10K, 5%, 1/4W	R20103
R22	Res, comp, 150K, 5%, 1/4W	R20154
R23	Res, comp, 4.7K, 5%, 1/4W	R20472
R24	Pot, trim, pc, min, 5K	R89502
R25	Res, comp, 10K, 5%, 1/4W	R20103
R26	Res, comp, 10K, 5%, 1/4W	R20103
R27	Not used	---
R28	Res, comp, 560Ω, 5%, 1/4W	R20561
R29	Res, comp, 27Ω, 5%, 1/4W	R20270
R30	Pot, trim, pc, 1K	R88102
R31	Res, comp, 1.8K, 5%, 1/4W	R20182
R32	Res, comp, 820Ω, 5%, 1/4W	R20821
R33	Res, comp, 150Ω, 5%, 1/4W	R20151

FREQUENCY GENERATOR PC BD ASSY (CONT.)

REF DESIG	DESCRIPTION	P/N
R34	Res, comp, 10K, 5%, 1/4W	R20103
R35	Res, comp, 6.8K, 5%, 1/4W	R20682
R36	Res, comp, 6.8K, 5%, 1/4W	R20682
R37	Res, comp, 10K, 5%, 1/4W	R20103
R38	Res, comp, 82K, 5%, 1/4W	R20823
R39	Res, comp, 82K, 5%, 1/4W	R20823
R40	Res, comp, 33K, 5%, 1/4W	R20333
R41	Res, comp, 100Ω, 5%, 1/4W	R20101
R42	Res, comp, 22K, 5%, 1/4W	R20223
R43	Res, comp, 1.2K, 5%, 1/4W	R20122
R44	Res, comp, 100Ω, 5%, 1/4W	R20101
R45	Res, comp, 470Ω, 5%, 1/4W	R20471
R46	Pot, trim, pc, 5K	R88502
R47	Res, comp, 100Ω, 5%, 1/4W	R20101
T1	Transformer, 2-30 MHz, broadband	T10200
Y1	Crystal, usb, carrier	Y101XX**
Y2	Crystal, lsb, carrier	Y101XX
Y3	Crystal, usb, 2nd lo	Y103XX**
Y4	Crystal, lsb, 2nd lo	Y103XX
Y5	Crystal, channel	Y20001***
Y6	Crystal, channel	Y20001***
Y7	Crystal, channel	Y20001***
Y8	Crystal, channel	Y20001***
Y9	Crystal, channel	Y20001***
Y10	Crystal, channel	Y20001***
Y11	Crystal, channel	Y20001***
Y12	Crystal, channel	Y20001***
Y13	Crystal, channel	Y20001***
Y14	Crystal, channel	Y20001***

**Frequency Assignment per channel frequency requirement. When ordering, specify all channel carrier frequencies being used. Refer to table 4-2.

***Frequency is specified as desired channel carrier frequency + IF FREQ (MHz). Example:

SSB, USB apparent carrier or AM true carrier frequency of 4.00000 MHz equals CHANNEL CRYSTAL FREQUENCY of 4.00000 + 1.500000 or 5.500000 MHz. (+ 1.400000 for 1.4 MHz IF.)

When ordering new channel crystals specify whether you are ordering

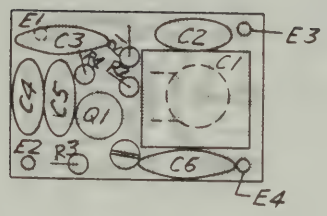
CHANNEL CRYSTAL FREQUENCY OR
CHANNEL CARRIER FREQUENCY

CHANNEL OSCILLATOR PC BOARD A1-A10

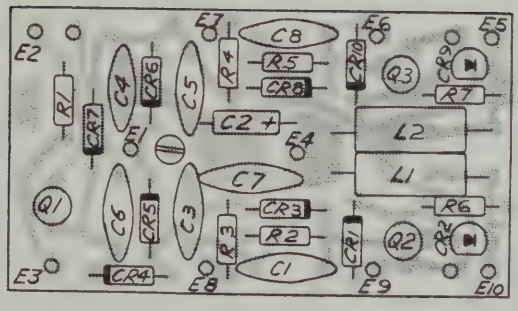
REF DESIG	DESCRIPTION	SRS P/N
---	CHANNEL OSCILLATOR PC BOARD, as listed below:	
	1.6-3.5 MHz	200580-1
	3.5-12.0 MHz	200580-2
	12.0-18.0 MHz	200580-3
	18.0-30.0 MHz	200580-4
C1	Cap, as listed below:	
	1.6-3.5 MHz: air, var, 2.2-34pF	C60001
	3.5-12.0 MHz: air, var, 2.2-34pF	C60001
	12.0-18.0 MHz: air, var, 2.2-34pF	C60001
	18.0-30.0 MHz: piston, var, 1-20pF	C61002
C2	Cap, mica, 18pF, 5%, 500 Vdcw	C05180
C3	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C4	Cap, mica, ___pF, 5%, 500 Vdcw, as listed below:	
	1.6-3.5 MHz: 390pF	C05391
	3.5-12.0 MHz: 270pF	C05271
	12.0-18.0 MHz: 270pF	C05271
	18.0-30.0 MHz: 180pF	C05181
C5	Cap, mica, ___pF, 5%, 500 Vdcw, as listed below:	
	1.6-3.5 MHz: 220pF	C05221
	3.5-12.0 MHz: 100pF	C05101
	12.0-18.0 MHz: 100pF	C05101
	18.0-30.0 MHz: 100pF	C05101
C6	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
MP1	Screw, nylon, 2-56 x 3/8	H4206A
MP2	Nut, nylon, 2-56	H42000
Q1	Transistor, npn, 2N4123 (1.6-3.5 MHz)	Q41230
	OR Transistor, npn, 2N5179 (3.5-30 MHz)	Q51790
R1	Res, comp, 10K, 5%, 1/4W	R20103
R2	Res, comp, 15K, 5%, 1/4W	R20153
R3	Res, comp, 47Ω, 5%, 1/4W	R20470
R4	Res, comp, 1.2K, 5%, 1/4W	R20122

CLARIFIER PC BOARD ASSEMBLY A11

REF DESIG	DESCRIPTION	SRS P/N
---	CLARIFIER PC BOARD ASSEMBLY	200560
	with: Front Panel Control Pot, w/switch	R87502
	Control Knob	MP0402
	Front Panel Label	200122-2
C1	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C2	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C3	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C4	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C5	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C6	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C7	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C8	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
CR1	Diode, si, signal, 1N4148	CR4148
CR2	Varicap, MV2107	CR0100
CR3	Diode, si, signal, 1N4148	CR4148
CR4	Diode, si, signal, 1N4148	CR4148
CR5	Diode, si, signal, 1N4148	CR4148
CR6	Diode, si, signal, 1N4148	CR4148
CR7	Diode, si, signal, 1N4148	CR4148
CR8	Diode, si, signal, 1N4148	CR4148
CR9	Varicap, MV2107	CR0100
CR10	Diode, si, signal, 1N4148	CR4148
L1	Choke, rf, 10 mH	L10103
L2	Choke, rf, 10 mH	L10103
MP1	Screw, nylon, 2-56 x 3/8	H4206A
MP2	Nut, nylon, 2-56	H42000
Q1	Transistor, npn, 2N4123	Q41230
Q2	Transistor, npn, 2N4123	Q41230
Q3	Transistor, npn, 2N4123	Q41230
R1	Res, comp, 10K, 5%, 1/4W	R20103
R2	Res, comp, 10K, 5%, 1/4W	R20103
R3	Res, comp, 6.8K, 5%, 1/4W	R20682
R4	Res, comp, 6.8K, 5%, 1/4W	R20682
R5	Res, comp, 10K, 5%, 1/4W	R20103
R6	Res, comp, 470K, 5%, 1/4W	R20474
R7	Res, comp, 470K, 5%, 1/4W	R20474



Channel
Oscillator
Module



Clarifier Option

Figure 13-1 Channel Oscillator Boards
A6A1-A6A10 and Clarifier Board A6A11

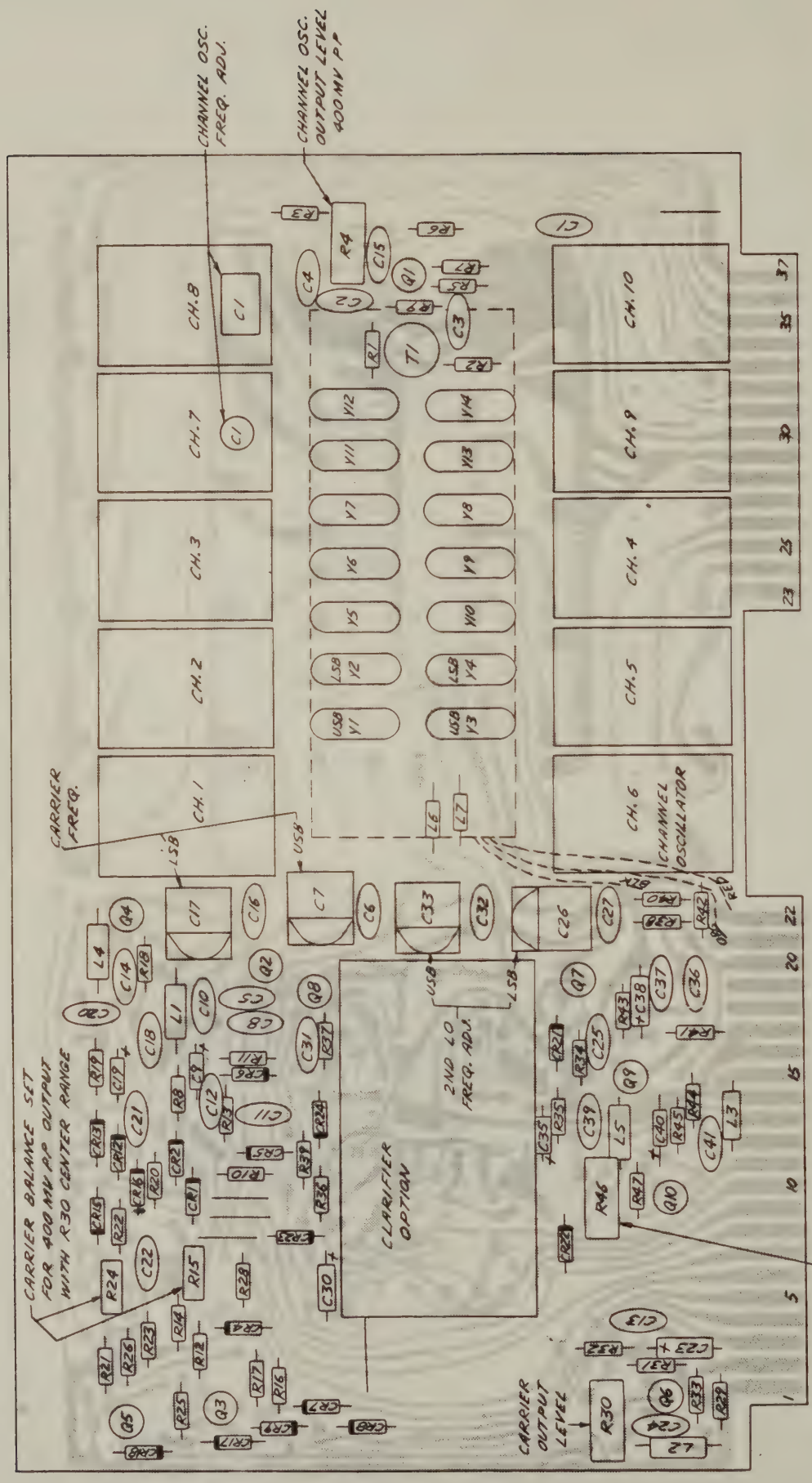
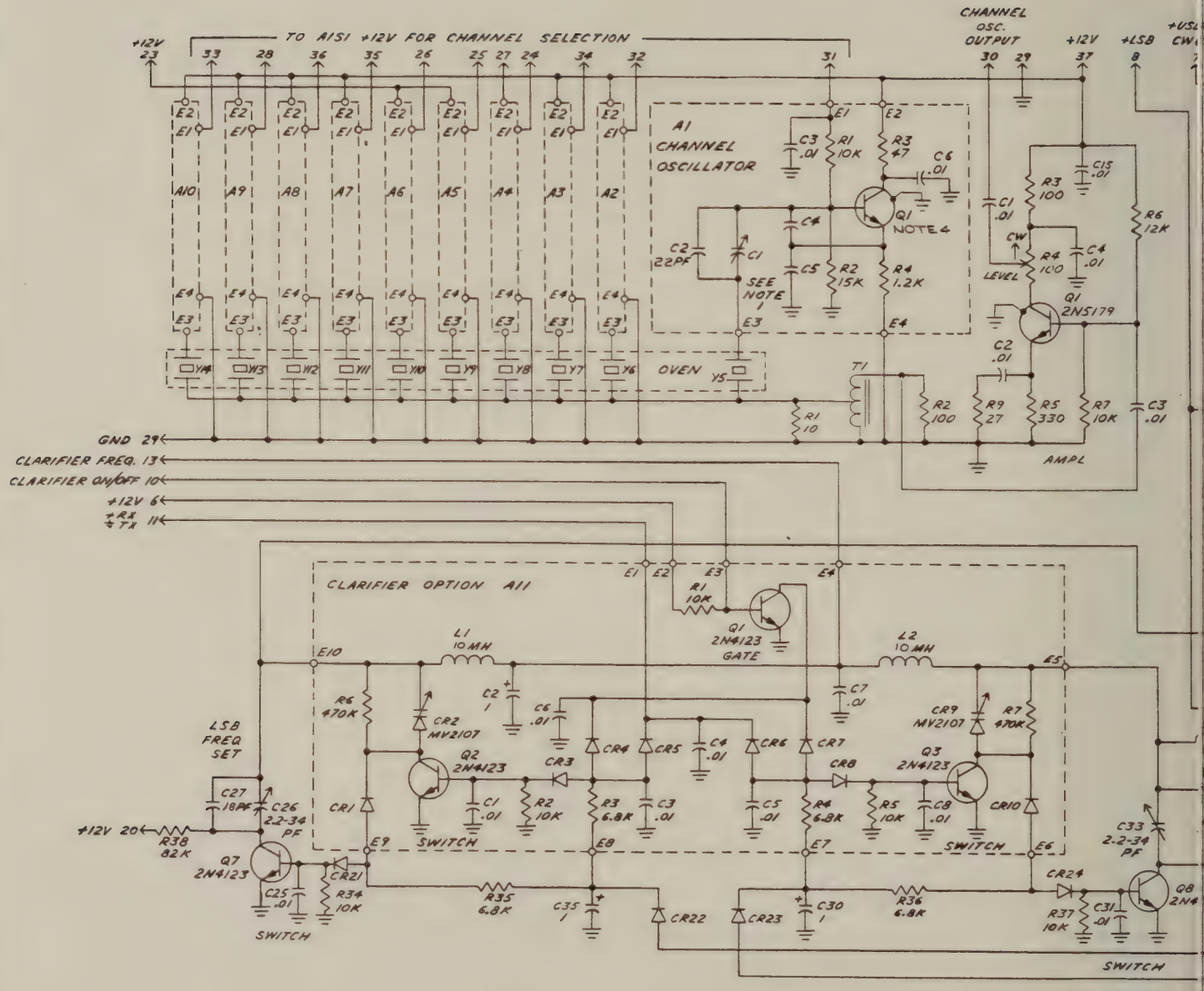
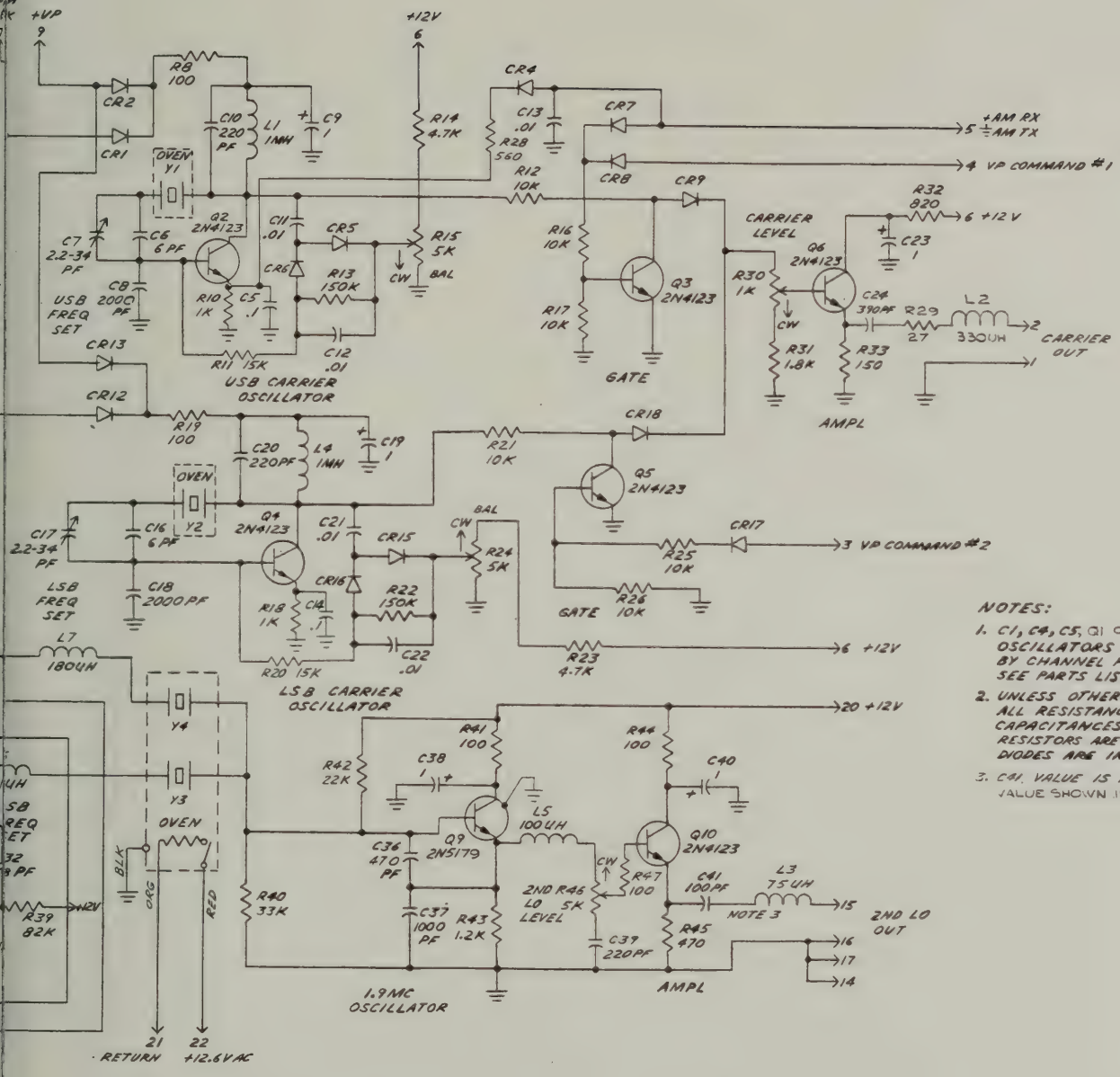


Figure 13-2. Frequency Generator Board A6


TO A1S1 +12V FOR CHANNEL SELECTION
+12V 23
33 28 36 35 26 25 27 24 34 32 31
CHANNEL OSC. OUTPUT
30 29 37 8
+12V
+LSB
A1 CHANNEL OSCILLATOR
A10 A9 A8 A7 A6 A5 A4 A3 A2
E1 E2 E3 E4
C1 .01
C2 22PF
C3 .01
C4 .01
C5 .01
C6 .01
R1 10K
R2 15K
R3 47
R4 1.2K
Q1 NOTE 4
SEE NOTE 1
Y4 Y3 Y2 Y11 Y10 Y9 Y8 Y7 Y6 OVEN Y5
T1
R1 10
R2 100
R3 100
R4 100
R5 330
R6 12K
R7 10K
R9 27
C15 .01
CW
LEVEL
Q1 2N5179
AMPL
GND 29
CLARIFIER FREQ. 13
CLARIFIER ON/OFF 10
+12V 6
+RX +TX 11
CLARIFIER OPTION A11
R1 10K
Q1 2N4123 GATE
L1 10 MH
L2 10 MH
E10 E9 E8 E7 E6 E5
R6 470K
CR2 MV2107
C2 1
C6 .01
C7 .01
CR9 MV2107
R7 470K
LSB FREQ SET
C27 18PF
C26 2.2-34 PF
Q2 2N4123
Q3 2N4123
CR1
CR3 CR4 CR5 CR6 CR7 CR8 CR10
C1 .01
R2 10K
R3 6.8K
C3 .01
C4 .01
C5 .01
R4 6.8K
R5 10K
C8 .01
SWITCH
+12V 20
R38 82K
Q7 2N4123
C25 .01
CR21
R34 10K
R35 6.8K
C35 1
CR22
CR23
C30 1
R36 6.8K
C33 2.2-34 PF
CR24
R37 10K
C31 .01
Q8 2N4
SWITCH



NOTES:

1. C1, C4, C5, Q1 ON CHANNEL OSCILLATORS DETERMINED BY CHANNEL FREQUENCY, SEE PARTS LIST.
2. UNLESS OTHERWISE SPECIFIED ALL RESISTANCES IN OHMS CAPACITANCES IN MICROFARADS RESISTORS ARE 1/4 WATT 5% CARBON DIODES ARE 1N4148
3. C41, VALUE IS 110 PF FOR 1.4 MHZ IF, VALUE SHOWN IS FOR 1.5 MHZ IF.

Figure 13-3. Frequency Generator PC Board (Simplex), Schematic Diagram

to-talk). Cw position of the control gives maximum sensitivity; ccw minimum. In the maximum cw position, all input signals will key the transmitter.

An antivox circuit, Q6 and Q7, is also incorporated. Adjustment of R15 desensitizes the VOX action in the presence of microphone feedback from the internal speaker.

14.4 SQUELCH MODULE A7A4.

The function of the squelch option is to eliminate the necessity of listening to noise in the absence of a desired signal. Refer to schematic diagram, Figure 14-4.

Q1 and Q2 form a bandpass amplifier having a maximum response between 400 and 800 Hz, the frequency range over which the majority of voice energy exists in sideband communications. Voice signals are detected by CR2 and drive switch Q3 discharging timing capacitor C8. Squelch threshold is established by a front panel control supplying bias to the emitter of Q3.

Each voice pulse discharges C8. Charging rate is determined by R11 and the beta of Q4. In the absence of voice, C8 will charge until VR1 fires (approximately 1 sec), turning on Q5 and Q6, which activate squelch transistor Q7. The audio output signal in the absence of voice is therefore shunted to ground. Squelched audio is suppressed 20 dB.

Front panel control R3 provides threshold control with maximum ccw being off. Cw position of the control gives maximum sensitivity; ccw minimum. In the maximum cw position all noise signals will unsquelch the receiver.

BASIC OPTION PC BOARD ASSY

REF DESIG	DESCRIPTION	SRS P/N
---	BASIC OPTION PC BOARD ASSEMBLY	200600
A1	CW PC Board Assembly	200660
	with: Front Panel Control Potentiometer*	R88502
	Control Knob*	MP0402
	Front Panel Label*	200122-7
A2	VOX PC Board Assembly	200670
	with: Front Panel Control Pot w/switch	R87502
	Control Knob	MP0402
	Front Panel Label	200122-4
A3	Special Option	---
A4	Squelch PC Board Assembly	200690
	with: Front Panel Control Pot w/switch	R87502
	Control Knob	MP0402
	Front Panel Label	200122-1
	Diode, si, signal, 1N4148	CR4148

*TR Delay Only

CW PC BOARD ASSEMBLY A1

REF DESIG	DESCRIPTION	SRS P/N
---	CW PC BOARD ASSEMBLY	200660
C1	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C2	Cap, mica, 1000pF, 5%, 500 Vdcw	C06102
C3	Cap, mica, 1000pF, 5%, 500 Vdcw	C06102
C4	Cap, mica, 2000pF, 5%, 500 Vdcw	C06202
C5	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C6	Cap, tant, 10μF, 10%, 20 Vdcw	C41064
C7	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C8*	Cap, tant, 5.6μF, 10%, 35 Vdcw	C45656
C9	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C10*	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
CR1	Diode, si, signal, 1N4148	CR4148
CR2*	Diode, si, signal, 1N4148	CR4148
CR3	Diode, si, signal, 1N4148	CR4148
MP1	(2) Screw, nylon, 2-56 x 3/8	H4206A
MP2	(2) Nut, nylon, 2-56	H42000
Q1	Transistor, pnp, 2N4125	Q41250
Q2	Transistor, npn, 2N4123	Q41230
Q3	Transistor, npn, 2N4123	Q41230
Q4	Transistor, npn, 2N4123	Q41230
Q5	Transistor, npn, 2N4123	Q41230
Q6	Transistor, pnp, 2N4125	Q41250
Q7	Transistor, npn, 2N4123	Q41230
Q8	Transistor, npn, 2N4123	Q41230
Q9	Transistor, pnp, 2N4125	Q41250
Q10*	Transistor, pnp, 2N4125	Q41250
Q11*	Transistor, npn, 2N4123	Q41230
R1	Res, comp, 12K, 5%, 1/4W	R20123
R2	Res, comp, 33K, 5%, 1/4W	R20333
R3	Res, comp, 1K, 5%, 1/4W	R20102
R4	Res, comp, 22K, 5%, 1/4W	R20223
R5	Res, comp, 56K, 5%, 1/4W	R20563
R6	Res, comp, 180K, 5%, 1/4W	R20184
R7	Res, comp, 180K, 5%, 1/4W	R20184
R8	Res, comp, 68K, 5%, 1/4W	R20683
R9	Res, comp, 10K, 5%, 1/4W	R20103
R10	Res, comp, 22K, 5%, 1/4W	R20223
R11	Res, comp, 4.7K, 5%, 1/4W	R20472
R12	Res, comp, 4.7K, 5%, 1/4W	R20472
R13	Res, comp, 4.7K, 5%, 1/4W	R20472
R14	Res, comp, 2.2K, 5%, 1/4W	R20222
R15	Res, comp, 3.3K, 5%, 1/4W	R20332

*Parts marked with an asterisk are for TR Relay option, not normally supplied with CW.

CW PC BOARD ASSEMBLY A1 (CONT.)

REF DESIG	DESCRIPTION	SRS P/N
R16	Res, comp, 10K, 5%, 1/4W	R20103
R17	Res, comp, 470Ω, 5%, 1/4W	R20471
R18	Res, comp, 1K, 5%, 1/4W	R20102
R19	Res, comp, 2.2K, 5%, 1/4W	R20222
R20	Pot, trim, pc, min, 10K	R89103
R21	Res, comp, 4.7K, 5%, 1/4W	R20472
R22*	Res, comp, 5.6K, 5%, 1/4W	R20562
R23*	Res, comp, 470Ω, 5%, 1/4W	R20471
R24*	Res, comp, 10K, 5%, 1/4W	R20103
R25*	Res, comp, 100Ω, 5%, 1/4W	R20101
R26	Res, comp, 10K, 5%, 1/4W	R20103
R27*	Pot, trim, pc, 5K	R88502

*Parts marked with an asterisk are for TR Relay option, not normally supplied with CW.

VOX PC BOARD ASSY A2

REF DESIG	DESCRIPTION	SRS P/N
---	VOX PC BOARD ASSEMBLY	200670
C1	Cap, tant, 10μF, 10%, 20 Vdcw	C41064
C2	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C3	Cap, mylar, 0.22μF, 10%, 100 Vdcw	C20220
C4	Cap, mylar, .047μF, 10%, 100 Vdcw	C20047
C5	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C6	Cap, tant, 22μF, 10%, 15 Vdcw	C42263
C7	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C8	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C9	Not used	---
C10	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C11	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C12	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C13	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C14	Cap, cer, .001μF, 10%, 500 Vdcw	C10010
CR1	Diode, si, signal, 1N4148	CR4148
CR2	Diode, si, signal, 1N4148	CR4148
CR3	Diode, si, signal, 1N4148	CR4148
CR4	Not used	---
CR5	Diode, si, signal, 1N4148	CR4148
CR6	Diode, si, signal, 1N4148	CR4148
CR7	Diode, si, signal, 1N4148	CR4148
CR8	Diode, si, signal, 1N4148	CR4148
L1	Choke, rf, 750μH	L10751
MP1	(2) Screw, nylon, 2-56 x 3/8	H4206A
MP2	(2) Nut, nylon, 2-56	H42000
Q1	Transistor, npn, 2N4123	Q41230
Q2	Transistor, pnp, 2N4125	Q41250
Q3	Transistor, npn, 2N4123	Q41230
Q4	Transistor, pnp, 2N4125	Q41250
Q5	Transistor, npn, 2N4123	Q41230
Q6	Transistor, npn, 2N4123	Q41230
Q7	Transistor, npn, 2N4123	Q41230
Q8	Transistor, npn, 2N4123	Q41230
R1	Res, comp, 22K, 5%, 1/4W	R20223
R2	Res, comp, 2.2K, 5%, 1/4W	R20222
R3	Res, comp, 560Ω, 5%, 1/4W	R20561
R4	Res, comp, 470Ω, 5%, 1/4W	R20471
R5	Res, comp, 4.7K, 5%, 1/4W	R20472
R6	Res, comp, 1K, 5%, 1/4W	R20102
R7	Res, comp, 560Ω, 5%, 1/4W	R20561

VOX PC BOARD ASSY A2 (CONT.)

REF DESIG	DESCRIPTION	SRS P/N
R8	Res, comp, 470Ω, 5%, 1/4W	R20471
R9	Not used	---
R10	Res, comp, 1K, 5%, 1/4W	R20102
R11	Pot, trim, pc, min, 10K	R89103
R12	Res, comp, 10Ω, 5%, 1/4W	R20100
R13	Res, comp, 10K, 5%, 1/4W	R20103
R14	Res, comp, 27K, 5%, 1/4W	R20273
R15	Pot, trim, pc, min, 5K	R89502
R16	Res, comp, 4.7K, 5%, 1/4W	R20472
R17	Res, comp, 100Ω, 5%, 1/4W	R20101
R18	Res, comp, 1 meg, 5%, 1/4W	R20105
R19	Res, comp, 1K, 5%, 1/4W	R20102
R20*	Pot, trim, pc, 5K	R88502
R21	Res, comp, 10K, 5%, 1/4W	R20103
VR1	Diode, zener, 6.8V, 5%, 400 mW, 1N754A	VR7540

*Used in absence of front panel control.

SQUELCH PC BOARD ASSY A4

REF DESIG	DESCRIPTION	SRS P/N
---	SQUELCH PC BOARD ASSEMBLY	200690
C1	Cap, tant, 10μF, 10%, 20 Vdcw	C41064
C2	Not used	---
C3	Cap, mylar, 0.22μF, 10%, 100 Vdcw	C20220
C4	Cap, mylar, 0.047μF, 10%, 100 Vdcw	C20047
C5	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C6	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C7	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C8	Cap, tant, 5.6μF, 10%, 35 Vdcw	C45656
C9	Cap, tant, 1.0μF, 10%, 35 Vdcw	C41056
C10	Cap, tant, 100μF, 20%, 10 Vdcw	C41072
C11	Cap, cer, .01μF, 20%, 500 Vdcw	C10100
C12	Cap, tant, 10μF, 10%, 20 Vdcw	C41064
CR1	Diode, si, signal, 1N4148	CR4148
CR2	Diode, si, signal, 1N4148	CR4148
CR3	Diode, si, signal, 1N4148	CR4148
MP1	(2) Screw, nylon, 2-56 x 3/8	H4206A
MP2	(2) Nut, nylon, 2-56	H42000
Q1	Transistor, npn, 2N4123	Q41230
Q2	Transistor, pnp, 2N4125	Q41250
Q3	Transistor, npn, 2N4123	Q41230
Q4	Transistor, pnp, 2N4125	Q41250
Q5	Transistor, npn, 2N4123	Q41230
Q6	Transistor, pnp, 2N4125	Q41250
Q7	Transistor, npn, 2N1613	Q16130
R1	Res, comp, 22K, 5%, 1/4W	R20223
R2	Res, comp, 1.5K, 5%, 1/4W	R20152
R3	Res, comp, 680Ω, 5%, 1/4W	R20681
R4	Res, comp, 560Ω, 5%, 1/4W	R20561
R5	Res, comp, 270Ω, 5%, 1/4W	R20471
R6	Res, comp, 4.7K, 5%, 1/4W	R20472
R7	Res, comp, 10K, 5%, 1/4W	R20103
R8	Res, comp, 1K, 5%, 1/4W	R20102
R9	Res, comp, 470Ω, 5%, 1/4W	R20471
R10	Res, comp, 2.7K, 5%, 1/4W	R20272
R11	Res, comp, 2.2K, 5%, 1/4W	R20222
R12	Res, comp, 22K, 5%, 1/4W	R20223
R13	Res, comp, 10K, 5%, 1/4W	R20103
R14	Res, comp, 22K, 5%, 1/4W	R20223
R15	Res, comp, 1K, 5%, 1/4W	R20102
R16	Pot, trim, pc, 10K	R88103
R17	Res, comp, 22K, 5%, 1/4W	R20223
VR1	Diode, zener, 6.8V, 5%, 400 mW, 1N754A	VR7540

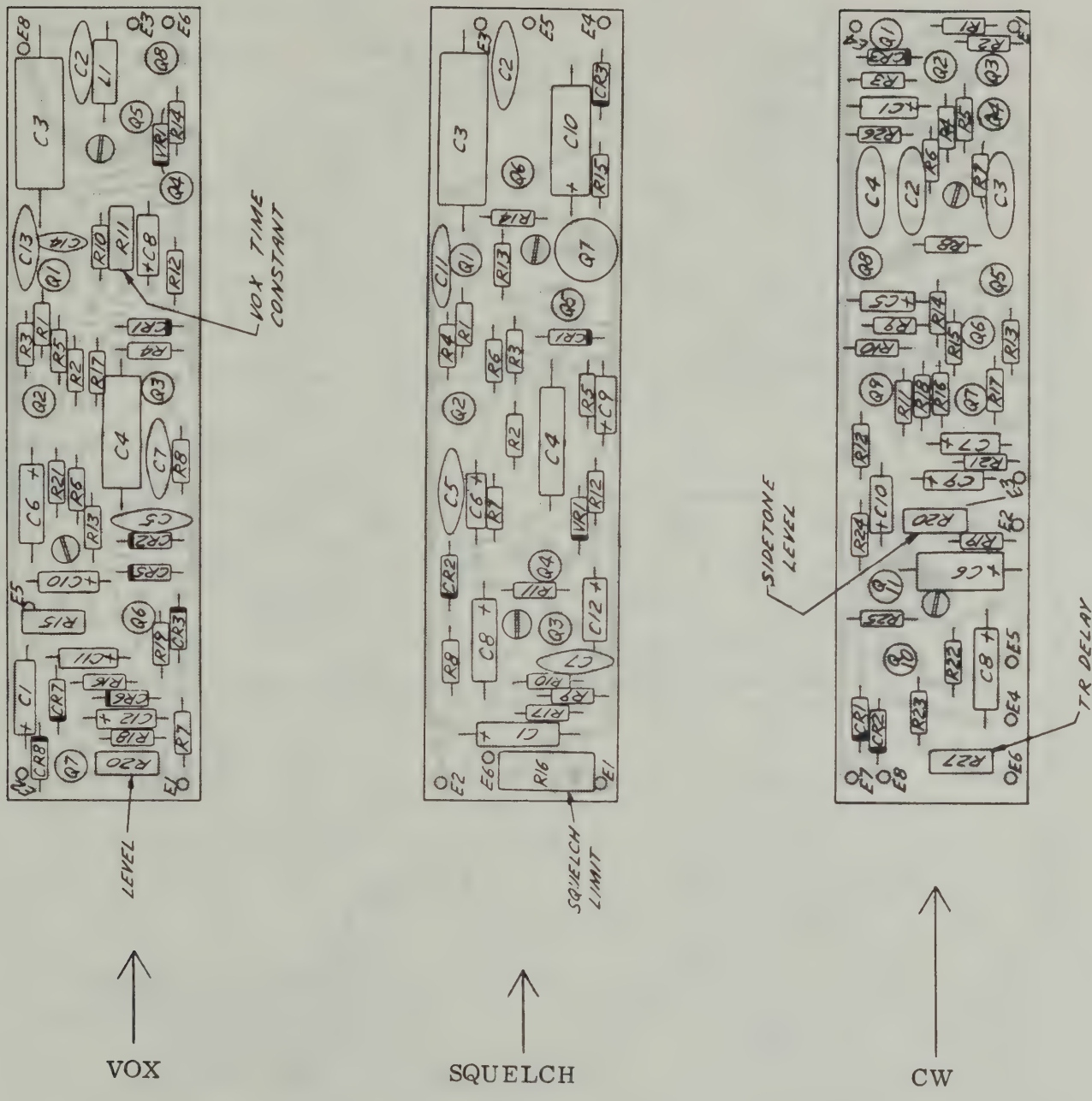
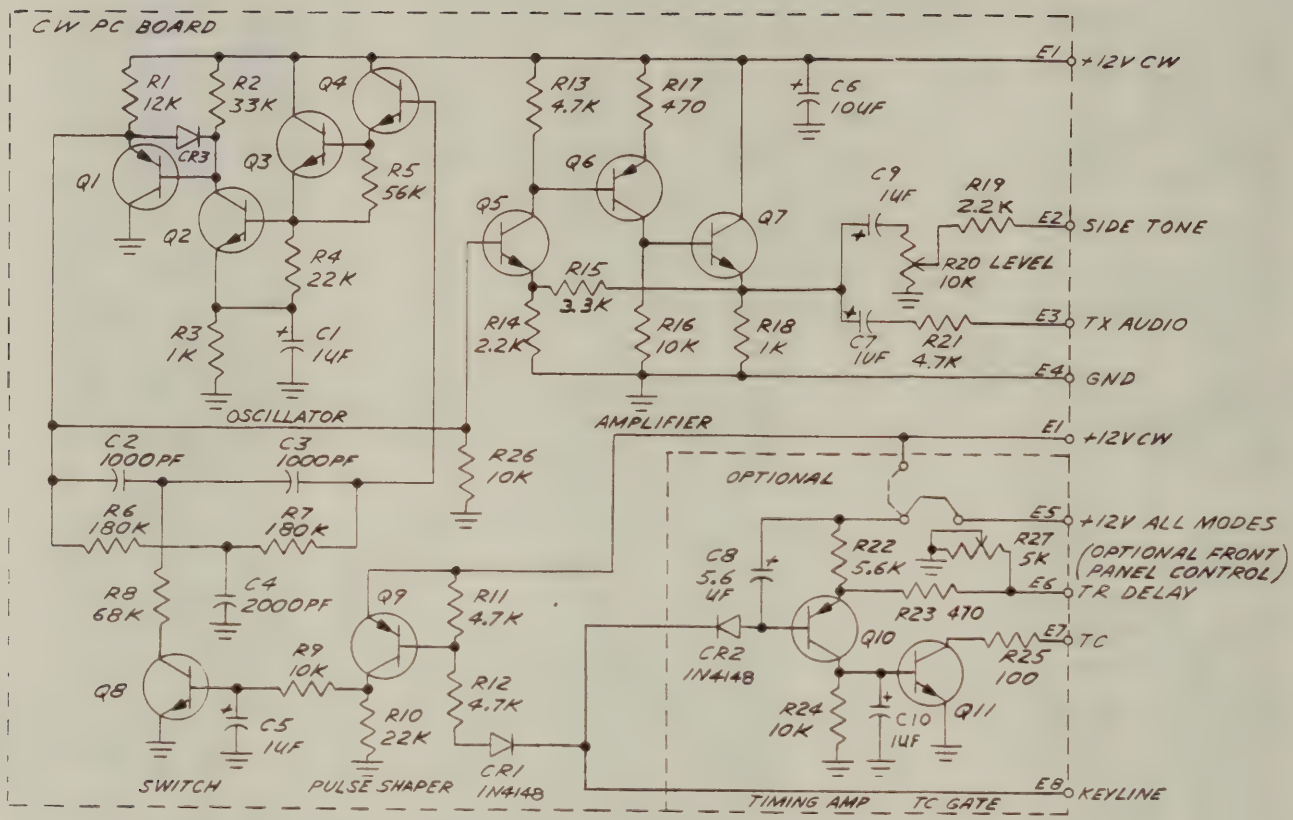


Figure 14-1. Vox, Squelch, and CW PC Board Assemblies



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
RESISTANCES ARE IN OHMS
RESISTORS ARE 1/4W 5% CARBON
TRANSISTORS ARE
PNP – 2N4125
NPN – 2N4123

Figure 14-2. CW PC Board Assembly A7A1, Schematic Diagram

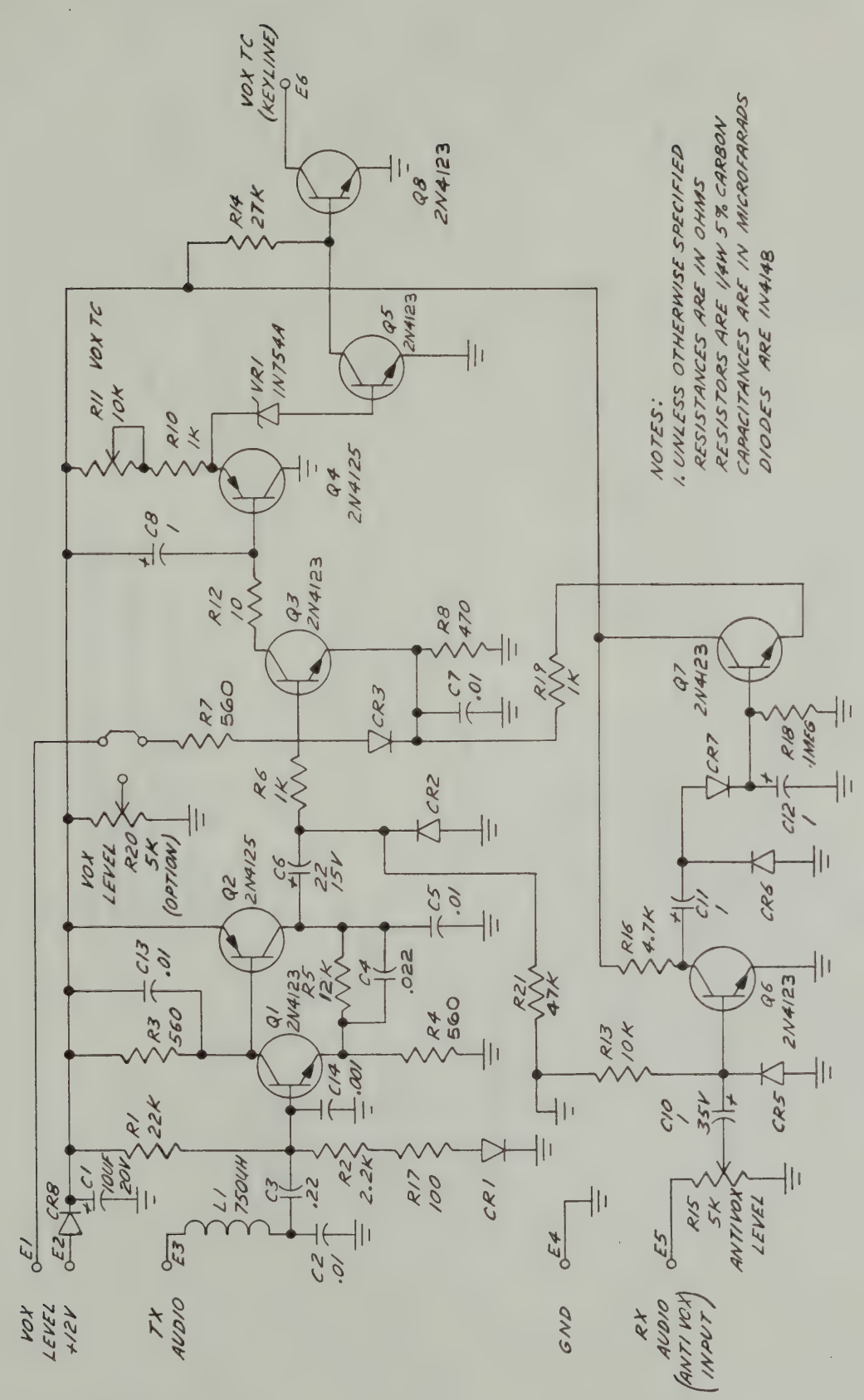


Figure 14-3. VOX PC Board A7A2, Schematic Diagram

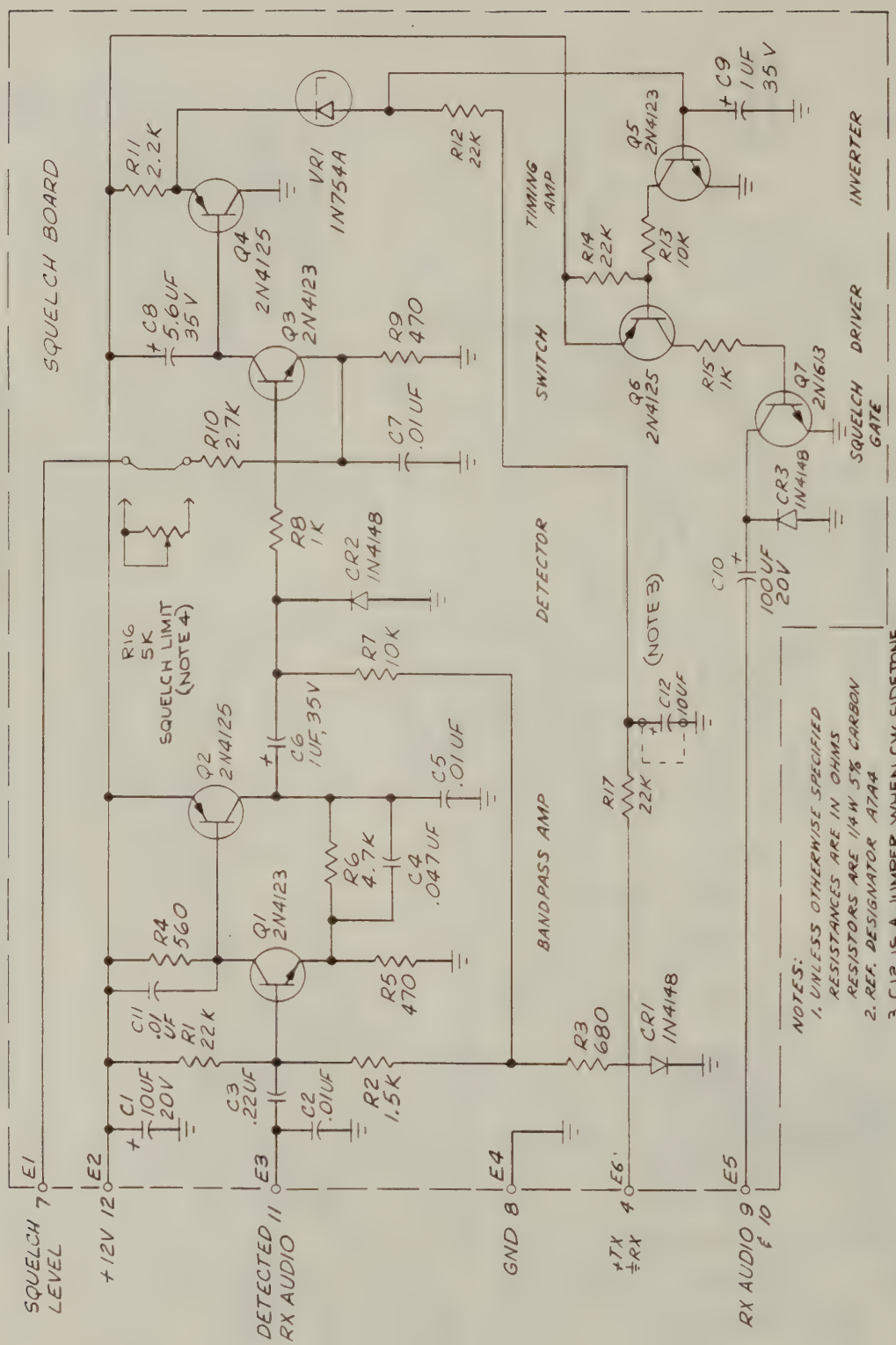


Figure 14-4. Squelch PC Board A7A4, Schematic Diagram

S-R-206,-210 (AN/URC-77)
(EXTRA PAGES)